

WHO CHRONICLE

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WORLD HEALTH ORGANIZATION

LET us always remember that leprosy is not a social stigma, but an intensely interesting disease demanding the attention of the best minds, and offering a rich and, as yet, largely unexplored field for research

COCHRANE

AUJOURD'HUI l'homme n'est plus la proie d'une lèpre inéluctable. Il sait même mieux se défendre contre elle que contre la tuberculose. Ce ne sont donc plus les armes qui lui manquent, mais la ferme volonté d'agir et la persévérance dans l'action.

CHAUSSINAND

INTRODUCTION

Leprosy which may affect between 10 and 12 million people throughout the world is a disease of many as yet unsolved problems. It is accepted that the causative organism is *Mycobacterium leprae* but this organism has never been cultivated outside the human tissues and there is no satisfactory evidence that the disease can be transmitted experimentally to animals or to man in spite of many attempts at transmission. The structure of *M. leprae* in the treated and in the untreated case raises many unanswered questions in the realm of bacteriology. Although leprosy is a communicable disease of bacterial origin the host-parasite relationship is not well understood. Thus in endemic areas most adults appear to be resistant. Before puberty susceptibility seems to be higher than it is in later life although even this is contested. No laboratory procedures exist to measure specific immunity to the disease. A specific antigen is lacking a situation which is complicated by the fact that *M. leprae* bears an antigenic relationship to other acid fast organisms especially *M. tuberculosis*. Indeed tuberculosis is the most frequent concurrent infection and is often the cause of death of the leprosy patient. The demonstrable existence of antibodies is no index of effective defence against the disease in fact the greater their amount the less the resistance of the tissues.

The degree of infectivity of the disease is another much debated point. Prolonged intimate contact is postulated for infection to be transferred but some leprologists doubt whether it need be prolonged and hold the view that repeated contact is enough

perhaps even a single contact in suitable circumstances. The duration of the incubation period is not exactly known but it is very long. It cannot be measured accurately until a reliable diagnostic test is devised that will show when a person is infected. Nor are these the only controversial questions. It is not known whether infection occurs through the skin or through the upper respiratory tract it may be through both. Males are affected more frequently than females but whether this is because of some inborn characteristic or because of increased opportunities of contact has not been determined. The influence of race, diet and climate is unknown no-one is now prepared to assert roundly as Jonathan Hutchinson did in the last century that leprosy is caused by eating fish especially bad fish. Finally the disease is so protean in its manifestations that the classification of the various forms is still the subject of much confusion and controversy.

In the realm of prophylaxis although happily not in that of treatment there is one major subject of controversy the role of BCG vaccination. The use of BCG is based on the observation that the tuberculoid form of leprosy is often self healing and is characterized by a strong lepromin reaction. The argument in favour of BCG is that it makes the lepromin test positive and therefore stimulates a tissue defence mechanism which if it does not prevent a person from contracting leprosy will at least prevent him from contracting the more dangerous form of the disease. Many leprologists regard this argument as fallacious.

With so many problems unsolved it is not surprising that in the Christian Medical College Vellore South India it is quite usual for students when they arrive to be shown leprosy cases as an introduction to all branches of medical science.² The study of

¹ The survey has been prepared with the assistance of Dr J. G. Priest, Chief Medical Officer Leprosy, WHO Headquarters. The parts on differential diagnosis and treatment are prepared by Dr V. M. Kumar, Domo, Guaya. The book will be published in booklet form as one of a series of studies devoted to leprosy. See also WHO activity. The previous publication in the series were: *Leishmaniasis* world problem by T. G. He & R. W. Leo (1954); *Malaria* world problem by E. J. Pampian & F. R. Webb (1953); *Dysentery* world problem by H. S. Gair & Z. Deitchman (1956) and *International work in leprosy* 1948-1958 (1959).

² Cochrane, R. G. (1959) *Leprosy in theory and practice*. Br. J. Leprosy 19, 6.

leprosy does indeed require the co operation of anatomist physiologist bacteriologist radiologist physician and surgeon Happily an attack and a successful attack on the disease can be made without waiting for solutions to all its problems

The following pages describe the work of WHO in the field of leprosy

LEPROSY IN THE PAST

It was long believed that the disease *zaraath* described in Leviticus XIII and XIV is leprosy Since the beginning of this century however opinions have differed about the interpretation of this word certain authors hold that *zaraath* does represent leprosy as it is known today others think it is a group of skin diseases totally different from leprosy Whichever the correct interpretation the disease mentioned in Leviticus is not just an ordinary disease it is a divine chastisement the leper is an impure person and has to be segregated from society The horror and loathing inspired by the leper are partly derived from this biblical view of him as a person who has incurred divine disfavour partly also derived from the mutilations and deformities that may occur in this disease and are often repellent in aspect

During the Middle Ages leprosy increased considerably in Europe in 1244 there were more than 19 000 leproseries in Christendom — in France alone more than 2000³ The biblical attitude to the disease was a marked feature of the Middle Ages and led to the indiscriminate and compulsory segregation of all lepers Priests were charged with the execution of the sentence of segregation When someone was pronounced to be a leper a decree was published in the parish church and the following Sunday the parish priest met the leper who now had to dress in black at a place outside the town conducted him to the church and there in a place set apart administered the last mass Afterwards the leper was conducted to a neighbouring leprosarium in which a temporary hut had been built The priest then took a

handful of sand from the roof of the hut and pronounced the terrible sentence *Sis mortuus mundo vivas iterum Deo* (Henceforth be dead to the world and live in God")

Then the prohibitions to lepers were read out They could not enter churches mills markets or any public meeting place wash their hands or personal property in rivers used by healthy persons touch anything for sale with their hands only with a stick or walk barefoot They had to dress only in the black leper's habit carry a rattle to warn people of their approach and avoid narrow roads to prevent dangerous contact They were required not to answer the questions of healthy persons if the latter were against the wind so that infection should not be carried down wind The civil laws prohibited them from buying property making wills and inheriting property

Little by little owing possibly to the severe segregation measures but also possibly just as much to the improvement in living conditions in Europe leprosy began to decrease and in France in 1644 Louis XIV suppressed all leprosy institutions⁴

THE LEGEND OF LLEPROSY

The long series of religious stories about leprosy the popular belief that leprosy inevitably gives rise to deformities and mutilations the great number of unknown factors in the etiology and pathology of the disease and the fact that for many years its study has been isolated from the general stream of medical progress have all contributed to create and perpetuate the legend of leprosy with support also from literature and painting

This legend is based on three false assumptions that leprosy is a very contagious disease perhaps the most contagious of all diseases that it is incurable and that leprosy patients are people apart accursed and possessed of a special psychology

This legend is deeply rooted in the minds of most people at all levels of society it makes for considerable difficulty in advancing

knowledge of the disease and is a serious drawback in most of the countries for which leprosy control campaigns are being planned. The first objective of the leprosy education of the public should be to counteract and destroy the legend and convince people that leprosy is a disease like other diseases and less contagious than others than tuberculosis for example. It is a very curious phenomenon that the people who are the first to protest indignantly at the idea of indiscriminate segregation of tuberculosis patients accept and even demand the indiscriminate segregation of leprosy patients who are much less contagious.

CLASSIFICATION AND SPREAD

In the first scientific publications on leprosy in this century two different clinical forms were distinguished with transitional stages between cutaneous or tuberculous leprosy and neural or anaesthetic leprosy there being also mixed cases having symptoms in both the skin and nerves. These classifications were approved by the Leonard Wood Memorial Round Table Conference at Manila in 1931.

At the Fourth International Congress on Leprology in Cairo in 1938⁶ the malignant (lepromatous) type was defined as being characterized clinically by the presence of skin lesions (generally lepromata) bacteriologically by the numerous bacilli in globi in the nasal mucosa and skin lesions histologically by the existence of lepra cells and immunologically by the negativity of the Mitsuda lepromin reaction. This classification remained unchanged at the Sixth International Congress.

The neural form was held to include all non lepromatous clinical types of leprosy the polyneuropathic maculo-anaesthetic and tuberculoid. Many leprologists have remained more or less attached to this classification into lepromatous and neural forms. The leprologists of South America have never accepted it however and in the following years first at regional meetings and then at the Second Pan American Conference

on leprosy in Rio de Janeiro in 1946⁷ they adopted a system of classification suggested by Rabello which was afterwards approved by the Fifth International Congress on Leprology Havana 1948⁸.

At this Congress two polar types of leprosy were admitted defined by their clinical bacteriological histopathological and immunological characteristics the lepromatous type of the Cairo Congress and a tuberculoid polar type in which there are arciform skin lesions with a tendency to peripheral spread and central healing without bacilli (or exceptionally with very few bacilli) with a strong reaction to lepromin and presenting a tuberculoid histopathological picture. In addition to these polar types of stable form there exists an unstable indeterminate group which after a certain time evolves towards one or other of the polar types or undergoes regression. In this type the cutaneous lesions are macular cases may be bacteriologically positive but are more frequently negative the Mitsuda reaction is negative or sometimes positive but if positive is less intense than in the polar tuberculoid form and the histological picture shows an uncharacteristic inflammatory reaction.

This classification was adopted in spite of protests by a great number of leprologists. Professor Gay Prieto in the face of the dogmatic insistence of South American authors on two opposed polar forms expressed the view that "Nature ignores the rigid moulds into which we attempt to fit the observed clinical facts and consequently there must necessarily exist intermediate forms which constitute the links of an unbroken chain which connects the polar forms."

In the report of a WHO Expert Committee on Leprosy which met in Rio de Janeiro in 1952¹⁰ the over rigid conclusions of the Havana Congress were mitigated. The Committee recognized the existence of the two polar types lepromatous and tuber-

1 J Leprosy 1947 25 100

Memoria del V Congreso Internacional de Leprosy La Habana, Ed to 1951

Cu y Prieto 3 119 11 J Leprosy 23 438

Wld Hlth Org Echoes R Se 1953 71

culoid subdividing the latter into major minor and reactional forms but gave a more comprehensive definition of the indeterminate group as

A benign form relatively unstable seldom positive on bacteriological examination presenting flat skin lesions which may be hypopigmented erythematous or hyperpigmented with a reaction to lepromin variable from case to case. Polyneuritic manifestations may develop in cases which have persisted in this form for long periods. The indeterminate form consists essentially of the simple macular cases and comprises those cases previously known as maculo anaesthetic. Cases of this form may evolve toward the lepromatous form or the tuberculoid form or may remain unchanged indefinitely.

A fourth group borderline leprosy was also defined as A malign form very unstable almost always strongly positive on bacteriological examination generally negative to lepromin This form frequently arises from the tuberculoid form as a result of repeated reactions and sometimes evolves to the lepromatous form

The Sixth International Congress on Leprology held in Madrid in 1953¹¹ made only one change in the classification formulated by the Expert Committee on Leprosy adding a new category macular tuberculoid leprosy characterized by flat skin lesions with very well-defined edges and a tendency to central healing.

H. W. Wade in a special note¹ proposed to add two further groups to the four groups adopted by the Madrid Congress—a maculo-anaesthetic group and a polyneuritic group without skin lesions on the ground that it would not be possible to classify more exactly the cases without skin symptoms. It was held however that the suggested maculo-anaesthetic group had been included partly in the indeterminate group partly in the tuberculoid polar type as macular tuberculoid.

A comparison of the classification of the WHO Expert Committee and of the Madrid Congress appears in Table 1 together with

a simple classification of the population for the purposes of mass leprosy campaigns

The differences of opinion among leprologists on the classification of manifestations of the disease are rooted in the diversity of these manifestations. It is argued that the classification adopted at the suggestion of the South American leprologists is not really a classification at all but the expression of physiopathological doctrine for it is impossible to classify a disease according to four different criteria. In any case the pattern of leprosy, the dominance of one or other of the clinical forms, changes considerably from one country to another. There are very few leprologists with a wide knowledge of all the regional variations of the disease and individual leprologists in discussions about classification tend to speak only of their own experience which may be very different from that of the other speakers. The majority of leprologists have in mind one static and immutable disease but leprosy like other diseases and indeed like the manifestations of life itself is constantly changing and subject to transformation. It is not only the indeterminate groups it is held which are unstable and changeable the polar types at the beginning of their evolution are subject to mutation and the transition from tuberculoid to lepromatous type has been observed by all experienced leprologists. In exceptional cases indeed some leprologists claim to have observed the evolution of the lepromatous type first towards the borderline group and then towards the tuberculoid polar type. From the point of view of public health however especially in the organization of mass campaigns against leprosy it is more important to classify the population in which the disease appears than it is to classify the disease itself into categories meeting the approval of all leprologists.

The WHO Expert Committee on Leprosy which met in 1952 proposed an administrative classification of leprosy into two forms open and closed (infectious and non infectious) depending on whether the cases are bacteriologically positive or negative when assessed by standard methods of examination of the skin lesions or nasal mucosa.

Atm i d i l l Cong e l a cional de Leprologia.
At d r d 1953 p 75

M m i d i i C x I t i o n a l d e L e p r o l o g i a
 M d n d 1953 p 79

TABLE 1 CLASSIFICATIONS OF LEPROSY

Classification of WHO Expert Committee 1953	Classification of the 1st International Congress of Leprology Madrid 1953	Classification of the population for the mass campaign
Typ L Lepromatous type	Typ L Lepromatous type	Macillary form
Group B Borderline group	Group B Borderline group	Opportunistic
Group I Indeterminate	Group I Indeterminate group	Symmetrical form Form with well-defined Clinical
Typ T Tuberculoid type	Typ T Tuberculoid type	
	Typ T Tuberculoid type	
	Typ T Tuberculoid type	
		Latent form
		Contact form
		Contaminated form
		Rest of the population

There are also arrested or burnt out cases in which a relapse is possible. The contacts of these cases who are particularly exposed to infection should be kept under surveillance and sometimes given prophylactic treatment. As for the rest of the population if the prevalence rate is very high practically all persons should be considered as contacts and placed under periodical surveillance.

A WHO Expert Committee on Leprosy which met in August 1959 agreed that radical changes in classification from leprosy congress to leprosy congress should be avoided as they would inevitably lead to confusion and neutralize all efforts to arrive at the universal use of the same terminology. It felt however that the classification adopted at the Madrid Congress and endorsed at

the Tokyo Congress ³ is capable of improvement in detail and that the number of categories of leprosy might perhaps be increased to provide a complete picture of the disease in all its manifestations.

The request made at Tokyo that two subordinate groups the maculo-anaesthetic and the pure polyneuritic be recognized had met with opposition probably based on a misunderstanding of what exactly the groups would consist of and how their recognition would affect the basic principles of classification. The advocates of these new groups should the Committee thought publish the reasons for their views giving their opponents time to express their objections so that full consideration could be given to the question.

at the next international congress in 1963. In the meantime to avoid confusion in the use of the terms dimorphous and borderline the decision of the Tokyo Congress should be respected.

Generally the main factor in the spread of leprosy has been considered to be the infectiousness or non infectiousness of the leprosy cases but two other important factors should be considered. One is individual susceptibility which determines that not all the individuals in (often intimate and prolonged) contact with open (lepromatous) cases develop the disease. Susceptibility is greater in childhood but in some individuals does not diminish with age. Certain adults are so susceptible that occasional contact e.g. a visit to an endemic area is sufficient for them to become infected. The other factor is resistance to the disease which can be absolute. The fact of resistance explains the low rate of conjugal leprosy and the very few cases appearing in the personnel of leprosaria. It is illustrated by the exceptional clinical observations made by Gay Prieto and Contreras¹⁴ on a young man of 26 years who for 14 months was inoculated with the blood of patients with strong lepra reactions with the mucus from lepromatous patients laden with bacilli and with biopsy fragments. After 8 years of observation he had not developed the slightest suspicion of leprosy.

Relative resistance shown by a positive Mitsuda reaction has as a result that subjects when they become infected with leprosy get only the tuberculoid type. The combination of high susceptibility and high resistance very frequent in children explains why about 60% of infected children show the tuberculoid forms which can heal spontaneously and may also explain the patterns found in certain endemic areas as in Africa in which a high prevalence rate coincides with a very low lepromatous rate.

EXTENT OF THE PROBLEM

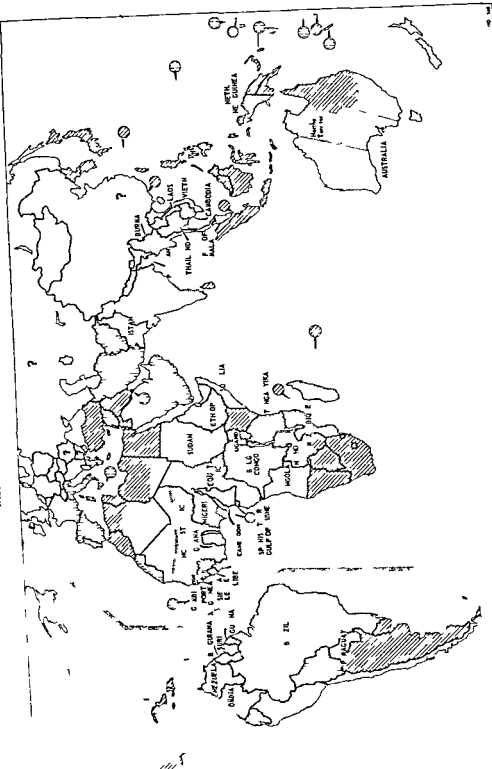
The registration of leprosy cases is notoriously difficult since the disease is prevalent in under developed countries which often

cover vast areas and there is no way of telling how many cases remain undiscovered in remote villages that are difficult or even impossible to reach. The fear of the stigma attaching to leprosy and of confinement in a leprosarium encourages sufferers to hide the disease as long as possible. Diagnosis although generally not very difficult presents pitfalls for certain types of leprosy. There are some individuals who spend most of their lives in leprosaria without actually having the disease and there are no doubt even more who though suffering from leprosy have been and are still being wrongly diagnosed as cases of yaws ringworm or nutritional or parasite diseases (see page 25). But by far the greatest obstacle to the compilation of adequate statistics on leprosy is the fact that the largest numbers of leprosy cases are to be found precisely in those countries where statistical services if they exist at all are only in embryonic form.

In these circumstances the only information on the extent of the problem consists of the estimates provided by experts or institutions dealing with the disease and the official figures of registered cases in each country supplied by governments to WHO. The unreliability of the first type of information is shown by the fact that it usually varies according to the individual or institution supplying it so that there is a choice of several figures which may differ widely. The official government figures though in some cases reasonably accurate do not as a rule reflect a true picture of the prevalence of the disease but merely indicate the degree of development of the country's statistical services. In a large country one or several districts provinces or other administrative entities may supply fairly accurate figures while others may supply none at all so that the total figures for the country remain unsatisfactory.

Again statistics for peoples living in countries where social and economic conditions are rapidly changing may be little more than guesswork. For example one country in the Western Pacific Region reported 15 000 cases of leprosy as being under treatment in 1950 22 000 in 1951

Gay Prieto J & Contreras F (1953) *Immunity in leprosy*. *Revista de Medicina y Cirugía* 1: 1-14.
L. P. of G. I. M. d. r. p. 475



15 000 in 1952 22 000 in 1953 16 000 in 1954 18 000 in 1955 and 24 000 in 1956 It is obvious that the variations are not entirely explained either by the number of cases cured or by new cases appearing from year to year They largely reflect the erratic nature of the reporting understandable in a new nation struggling to solve social and economic problems of enormous size The inadequacy of such figures for an evaluation of the extent of the problem is shown by the fact that according to figures submitted to the WHO Inter Regional Leprosy Conference at Tokyo in 1958 the estimated number of cases for the country was 100 000

It is one of WHO's tasks to make available in its monthly *Epidemiological and Vital Statistics Report* and its *Annual Epidemiological and Vital Statistics* the vital statistics whether complete or incomplete supplied by governments For the reasons given above any attempt to analyse the figures on leprosy given in these publications might produce misleading results However incomplete as they are the figures do at least give an idea of which countries are most affected

In addition to the figures supplied by governments for inclusion in WHO's statistical publications the Organization obtained in 1958 and 1959 some further information on the number of registered leprosy cases through a questionnaire to governments interested in leprosy control Other quantitative data are obtained from the leprosy control programmes undertaken with WHO help and from WHO experts who visit from time to time the regions where the disease is most highly prevalent

From all these data it is clear that at least 2 million cases of leprosy are at present registered throughout the world three quarters of them being under treatment The actual number of cases is of course higher some authorities putting it at between 10 and 12 million The figures given below therefore refer to the estimated number of cases unless otherwise indicated

Asia is considered to be the world's most important focus of leprosy no part of the continent being free from the disease The countries and territories most affected

include India (about 1 500 000 cases) Burma (about 200 000 cases) Thailand (about 200 000 cases) Indonesia (about 100 000 cases) Japan (about 15 000 cases) China (Taiwan) (about 8000 cases) Hong Kong (about 7000 cases) Ceylon (about 3500 cases) Endemicity is thought to be low in western Asia and Siberia There are about 20 000 cases in the Philippines

The whole of Africa is infected with leprosy the prevalence being particularly high in Nigeria (Northern Region) and in the territories formerly known as French West Africa and French Equatorial Africa Estimates of the total number of leprosy sufferers in the continent range between 1 1/2 and 2 million Estimates for individual countries and territories include Nigeria (more than 500 000 cases) French West Africa (about 500 000 cases) French Equatorial Africa (about 150 000 cases) Sierra Leone (about 100 000 cases) Tanganyika (about 100 000 cases) Mozambique (about 80 000 cases) Uganda (about 70 000 cases) Madagascar (about 35 000 cases) Togo (about 22 000 cases)

South America constitutes another major focus of the disease the prevalence being high in Brazil Colombia and Venezuela though nowhere in the Americas do the prevalence rates approach those of the Asian countries The number of known cases in South America is about 158 000 In North America the number of known cases is about 11 000 and in Central America less than a thousand There are some 11 000 known cases in the Caribbean area

Europe is on the whole free from leprosy but endemic foci still exist in the Mediterranean area notably in Spain (about 4000 known cases) Italy (about 400 known cases) and Malta (about 200 known cases) A few isolated cases exist in Finland Iceland and other European countries

Leprosy is endemic in many of the islands of Oceania particularly in Fiji (more than 500 known cases) Papua and New Guinea (about 8000 cases) the Solomon Islands (about 1000 known cases) and the Hawaiian archipelago Australia was said to have had more than 1000 cases in 1955

The picture of leprosy that will ultimately emerge when all cases of leprosy are identified and put under treatment remains a matter for speculation but it is clear that more epidemiological information on the disease is badly needed and that this can only be obtained through an effort of international collaboration

LEPROSY CONTROL

For many years antileprosy therapy was limited to the use of chaulmoogra oil and its ethyl ester. The only possibility of organizing an efficient fight against leprosy lay in the isolation of leprosy patients and the existing facilities for such isolation which was generally compulsory and indiscriminate and very inadequate in countries with high prevalence made leprosy control impossible. The number of patients isolated in leprosy institutions is only about 211 900¹. The lack of accommodation is the reason why many public health administrations even in countries where the prevalence is high avoid the problem the only care for leprosy patients being provided by non governmental organizations such as missions.

The discovery of sulfone in 1908 and the demonstration in 1937 by Fournieu et al¹⁶ of its effectiveness in bacterial infections radically changed the picture of leprosy control. In 1943 Faget and co workers⁷ demonstrated the efficacy of a derivative of sulfone Promin in leprosy therapy. From all parts of the world leprologists confirmed the efficacy of the new sulfone drugs and in 1948 Cochrane¹⁸ and Molesworth and others demonstrated the possibility of substituting DDS (4,4-diaminodiphenyl sulfone) injected intramuscularly in suspensions of peanut oil for the very expensive Promin. A few months afterwards Floch²⁰

began to administer the same drug orally. The efficacy, good tolerance, ease of administration and low price of DDS which is able to arrest clinical lesions in a relatively short time, bring about bacteriological negativity and diminish the infectiousness of open cases has opened the way for effective leprosy control. Other drugs have followed in the wake of the sulfones but their value is as yet largely unproven they may turn out to be equally effective alone or in combination with the sulfones.

THE ROLE OF WHO

In July 1948 the first World Health Assembly decided that the subject of leprosy should be given number six priority²¹. The Executive Board in January 1951 "noted with satisfaction that an Expert Advisory Panel on Leprosy had been set up from which an Expert Committee was to be convened in 1952 on the status of sulfone therapy, the effectiveness of the different preparations in use, their dosage, side effects and method of administration especially as regards undernourished patients which are the first topics to be discussed by this Committee"²².

Subsequent Health Assemblies discussed the promotion of leprosy control in different countries and it was decided to send short term consultants to advise the governments concerned on the more useful public health measures against leprosy. Finally in 1952 a WHO Expert Committee on Leprosy formulated the general principles that should govern leprosy campaigns. The Committee divided leprosy into "open" and "closed" cases according to whether leprosy bacilli are detectable by routine bacteriological examination or not. "Open" cases include all lepromatous and borderline cases many of the reactional tuberculoid cases and a small but varying percentage of others. "Closed" cases do not play any large part in the spread of the disease. This distinction between the two classes is the basis of the widely practised policy of confining segregation to "open"

Do H J A (1951) *Bull Off sanit* 4
Fournieu E et al (1937) *C R Acad Sci Paris* 294
Faget C H et al (1943) *Publ H H A* A J 58 79
Cochrane R G (1948) *Proc of the Fourth Int Cong on Leprosy*
of Leprosy, 1948, London, H K Lewis, p 374
Molesworth W H et al (1948) *Proc of the Fourth Int Cong on Leprosy*
of Leprosy, 1948, London, H K Lewis, p 374
Floch H (1949) *J Leprosy* 17 197
Faget C H & Desombes P (1951) *J Leprosy* 17 37

cases and the Committee could find no adequate evidence to justify a departure from this policy

Leprosy is not—the Committee insisted—a disease apart but a general public health problem in the countries where it is endemic. Any measures which raise standards of public health are therefore likely to help in the control of leprosy whether directed against specific infections or aimed at improving nutrition sanitation or housing. Specific leprosy control work must be undertaken by personnel within the general framework of the health administration of a country and the policy should be determined not by public fears and prejudices but by public health principles.

Treatment is most effective when given early for this reason a dispensary system aimed at the early detection and treatment of cases is a primary and essential element in the organization of leprosy control. The type of dispensary whether specialized or general fixed or mobile will depend on local circumstances. Whichever form it takes it should not only detect and treat cases it should also arrange for the placing of patients in suitable institutions if the regulations in force require that they be isolated select cases for domiciliary isolation where this is permissible and keep them under surveillance arrange prophylactic measures for children born of leprosy patients carry out welfare work and promote education regarding leprosy. It should have a few beds for patients being kept for observation or treatment or pending transfer to an institution.

Institutional isolation has failed as a control measure even when applied rigorously and on an adequate scale but if applied with discrimination and in combination with education and effective treatment of all the cases it retains an important place in the fight against leprosy. Only open cases need be subjected to it. The degree of isolation the methods of securing it and the amount of compulsion required will naturally vary from area to area. In some countries compulsion may be impossible in others where leprosy is not endemic and the disease shows no tendency to spread it may be unnecessary

notification with whatever surveillance is deemed necessary may be a sufficient addition to treatment. Nor should isolation be thought of solely in terms of leprosanatoria. Domiciliary isolation is suitable where the patient can be kept in separate quarters and treated locally. An asylum may be indicated for the permanently crippled patient in whom disease has died out and for whom there is no means of support outside and segregation villages or hamlets have been built and function successfully in some countries for infectious cases from several villages or to ensure regular treatment in countries with scattered populations. Hospitals or special hospital wards may be of value for the temporary treatment of cases needing special medical or surgical measures.

The Committee discussed methods of treatment the possibility of prophylaxis by BCG vaccination and the immunology of leprosy. Mass campaigns it felt should be organized in limited areas.

Following the recommendations of the Expert Committee on Leprosy WHO has continued and intensified its policy of helping countries in which leprosy is endemic. It encourages the study of local patterns of leprosy with the help of short term consultants whom it sends out to help advise the government concerned. Consultants have up to now visited the following countries and territories

Africa Belgian Congo French Cameroons the former French Equatorial and French West Africa Gambia Ghana Kenya Madagascar Nigeria (Eastern Northern and Western) the Portuguese territories of Angola New Guinea and Mozambique Tanganyika and Uganda

Americas Bolivia Colombia Ecuador Grenada Guadeloupe Guatemala Guyana Martinique Paraguay Peru St Lucia Trinidad Eastern Mediterranean Ethiopia Iran Iraq Pakistan and the Sudan

Europe Turkey

South East Asia Burma Ceylon Indonesia Thailand

Western Pacific Cambodia China (Taiwan) Korea Philippines Solomon Islands

TABLE 2 WHO FELLOWSHIPS IN LEPROSY

R g	1950	1951	1952	1953	1954	1955	1956	1957	1958	T t l
Afri										
B l g Co g	-	-	-	-	1	-	1	-	-	2
F h Eq t t Af	-	-	-	-	-	-	-	1	-	1
F h We t Af	-	-	-	-	-	-	-	1	2	3
G mb	-	-	-	-	-	-	1	-	-	1
Ng	-	-	-	-	-	-	-	-	-	1
P rt g t r t l	-	-	-	-	-	-	1	2	-	3
Rhod d Ny sa d	-	-	-	-	1	-	-	-	-	1
Am lc										
B l	-	1	-	-	-	-	-	-	-	1
E d	-	-	1	-	-	-	-	-	-	1
J m a	-	-	-	-	-	-	-	-	-	-
H	-	-	1	-	-	-	-	-	-	-
P ag y	-	-	-	-	-	-	3	5	-	-
T d d	-	-	-	-	-	-	1	-	-	-
S th E t A i										
B m	-	-	-	1	-	1	-	1	-	4
C yl	-	-	-	-	-	-	-	1	-	3
I d	1	-	-	-	-	-	-	2	-	-
I d	-	-	-	1	-	-	-	-	-	1
Th l d	-	-	-	1	-	1	-	-	2	4
E p										
Port g l	-	-	-	-	-	-	-	2	-	2
T rk	-	-	-	-	-	-	-	1	-	1
E t M d rr										
I	-	-	-	-	-	-	-	-	1	1
L b no	-	-	-	-	1	-	-	-	-	-
W t m P r										
x	-	-	-	-	-	-	-	-	-	3
P	-	-	-	-	-	-	-	-	-	-
Ph c	-	-	-	-	-	-	-	-	-	-
T t l	1	1	2	3	3	3	9	17	15	

case and the Committee could find no adequate evidence to justify a departure from this policy.

Leprosy is not—the Committee insisted—a disease apart but a general public health problem in the countries where it is endemic. Any measure which raises the standard of public health are therefore likely to help in the control of leprosy whether directed against the specific infection or aimed at improving nutrition, sanitation or housing. Specific leprosy control work must be undertaken by personnel within the general framework of the health administration of a country and the policy should be determined not by public fears and prejudices but by public health principles.

Treatment is most effective when given early for this reason a dispensary system aimed at the early detection and treatment of cases is a primary and essential element in the organization of leprosy control. The type of dispensary, whether specialized or general, fixed or mobile, will depend on local circumstances. Whichever form it takes, it should not only detect and treat cases, it should also arrange for the placing of patients in suitable institutions if the regulation in force require that they be isolated. Isolated cases for domiciliary isolation where this is permissible and keep them under surveillance, arrange prophylactic measures for children born of leprosy patients, carry out welfare work and promote education regarding leprosy. It should have a few beds for patients being kept for observation or treatment or pending transfer to an institution.

Institutional isolation has failed as a control measure even when applied rigorously and on an adequate scale but if applied with discrimination and in combination with education and effective treatment of all the cases, it retains an important place in the fight against leprosy. Only open cases need be subjected to it. The degree of isolation, the method of securing it and the amount of compulsion required will naturally vary from area to area. In some countries compulsion may be impossible in others where leprosy is not endemic and the disease shows no tendency to spread it may be unnecessary.

Notification with whatever surveillance is deemed necessary may be a sufficient addition to treatment. Nor should isolation be thought of solely in terms of leprosanatoria. Domiciliary isolation is suitable where the patient can be kept in separate quarters and treated locally. An asylum may be indicated for the permanently crippled patient in whom disease has died out and for whom there is no means of support outside and seclusionary villages or hamlets have been built and function successfully in some countries for infectious cases from several villages, or to ensure regular treatment in countries with scattered populations. No pitfall or special hospital ward may be of value for the temporary treatment of cases needing special medical or surgical measures.

The Committee discussed method of treatment, the possibility of prophylaxis by BCG vaccination and the immunology of leprosy. Mass campaigns it felt should be organized in limited areas.

Following the recommendation of the Expert Committee on Leprosy, WHO has continued and intensified its policy of helping countries in which leprosy is endemic. It encourages the study of local patterns of leprosy with the help of short term consultants whom it sends out to help advise the government concerned. Consultants have up to now visited the following countries and territories:

Africa Benin Congo French Cameroons the former French Equatorial and French West Africa Gambia Ghana Kenya Madagascar Nigeria (Eastern, Northern and Western) the Portuguese territories of Angola New Guinea and Mozambique Tanzania and Uganda

Americas Bolivia Colombia Ecuador Grenada Guadeloupe Guatemala Guyana Martinique Paraguay Peru St. Lucia Trinidad

Eastern Mediterranean Ethiopia Iran Iraq Pakistan and the Sudan

Europe Turkey

South-East Asia Burma Ceylon Indonesia, Thailand

Western Pacific Cambodia China (Taiwan) Korea, Philippines, Solomon Islands

TABLE 2 WHO FELLOWSHIPS IN LEPROSY

Reg	1950	1951	1952	1953	1954	1955	1956	1957	1958	T t l
Afri										
B lg C g	—	—	—	—	1	—	1	—	—	2
F h Eq t l Af	—	—	—	—	—	—	—	1	—	1
F h W l Af	—	—	—	—	—	—	—	1	2	3
G mb	—	—	—	—	—	—	1	—	—	1
N g	—	—	—	—	—	—	1	—	—	1
Port g set mt	—	—	—	—	—	—	1	2	—	3
Rh d a d Ny sal d	—	—	—	—	1	—	—	—	—	1
Am s										
Bra l	—	1	—	—	—	—	—	—	—	1
E d	—	—	1	—	—	—	—	—	—	1
J m	—	—	—	—	—	—	—	—	4	4
M	—	—	1	—	—	—	—	—	—	1
P g y	—	—	—	—	—	—	3	5	—	8
T d d	—	—	—	—	—	—	1	—	—	1
S th E t A l										
B m	—	—	—	1	—	1	—	1	—	3
C l	—	—	—	—	—	—	1	1	1	3
I d	1	—	—	—	—	—	—	2	1	4
I d	—	—	—	1	—	—	—	—	—	1
Th d	—	—	—	1	—	1	—	—	2	4
E p										
Port g l	—	—	—	—	—	—	—	2	—	2
T	—	—	—	—	—	—	—	1	—	1
E t M d t										
I	—	—	—	—	—	—	—	—	1	1
L	—	—	—	—	—	—	—	—	—	—
W t P if										
P	—	—	—	—	—	—	—	1	—	1
P	—	—	—	—	—	—	—	—	—	—
T t	1	1	—	3	3	3	9	17	1	38

WHO seeks to improve local staff engaged in the leprosy campaigns by means of fellowships (see Table 2). It promotes the development of local campaigns with the economic support of UNICEF/WHO giving technical advice or in certain countries e.g. Burma, Ceylon, Indonesia and Thailand collaborating directly by means of a WHO Senior Leprologist.

WHO re-examined its policy on leprosy control in December 1957 when an informal study group met in Geneva to review the recommendations in the first report of the WHO Expert Committee on Leprosy in the light of advances in leprology and the experience gained in five years of widespread mass leprosy campaigns.

In 1958 WHO policy in regard to leprosy control was laid down in a guide for those working in antileprosy campaigns.³ The fundamental purpose of any leprosy control campaign according to the guide is to render open cases non-infectious thus preventing the development of new cases and bringing about a progressive reduction in endemicity. The most important steps in the campaign are the early detection of all leprosy cases, regular treatment of all registered patients, protection of contacts against contagion and rehabilitation of cured persons.

The case-finding control programme, the different measures to be adopted in countries of high, medium and low endemicity, the various schedules for treatment, the criteria of arrest, the follow-up of cured cases and the criteria for discharge are carefully described in the guide.

In many countries experience has shown that a pilot project in a limited area is the best way to start a campaign. The teaching and training of campaign personnel can be begun in such a project and extension of the campaign to an increasingly wider area can be undertaken when funds and personnel permit.

The administration of the leprosy campaign, the teaching and training of personnel and the assessment of results of leprosy

control are also carefully described. Special emphasis is laid on health education not only of the general public but also of doctors, health personnel and patients. It is necessary in all such education to emphasize that leprosy is a curable disease that deformity can be avoided by prompt treatment in the early stages of the disease and that there are certain irreversible sequelae of some forms of leprosy which should not be interpreted to mean that the disease is not arrested or cured.

1958 was a very important year for WHO in the development of leprosy control. Following its policy to give help and advice to countries with high endemicity and limited resources, WHO established a leprosy unit at Headquarters to co-ordinate its work on leprosy throughout the world.

Regional and inter-regional meetings were organized to unify policy on leprosy control and to spread knowledge among the local staff of the countries interested in this problem. A leprosy advisory team composed of a leprologist (the team leader) and a statistician was established to assess the results of the leprosy campaigns in progress.

A UNICEF/WHO Joint Committee on Health Policy met in October 1958 to review leprosy control activities. Very satisfactory progress it noted had been made in 13 leprosy control projects jointly assisted by UNICEF and WHO, thereby confirming not only the effectiveness of the methods used (methods based essentially on medication with DDS) but also the possibility of organizing on a large scale both the detection and systematic recording of new cases and the mass treatment of known cases so as to ensure regularity and consequently effectiveness of treatment even in the most remote territories.

For the successful future development of projects receiving international assistance certain conditions must be fulfilled. The legislation of the country must be in accordance with the principles of WHO, international aid being given only to countries ready to use large-scale modern methods in the fight against leprosy. Every project should be preceded by a survey of local

conditions made by a WHO expert so as to enable him to draw up a plan of operations in agreement with the government health authorities. Projects should be long term and the period during which international assistance is given not less than five years. In many countries it is necessary for a WHO expert to assist for at least two years in establishing the project and he may possibly have to continue his collaboration during its expansion. If there is no resident WHO expert a visit lasting a few weeks should be made at least every two years by a WHO consultant in order to follow up operations and make any modifications necessary in the plan. In countries with insufficiently developed health services pilot projects or demonstration areas are the most suitable way of beginning the campaign.

Seminar on leprosy control

A seminar on leprosy control in the Americas had been held in Belo Horizonte, Brazil, a little earlier in June and July 1958 under the auspices of the Government of Brazil, PASB and WHO.²⁴ Its purpose was to enable the participants to exchange views on leprosy control and to discuss ways and means of attacking the problem in the Americas. Data—the participants agreed—are essential in any plan of control for the countries concerned, however not only are they scanty but they also lack uniformity and system. Consequently it is difficult if not impossible to compare the situation in different countries or even the situation in the same country at different times. There is an obvious need for an overhaul of statistical service and methods and in particular for the adoption of the grouping by age used in WHO statistics.

Leprosy control services are to be found at all stages of development in the Americas. On the whole they are poorly balanced and few of them are aware of the magnitude of the problem with which they are faced nor are they properly integrated with the general public health services or staffed with specially trained men. As a result control

programmes are as a rule inadequately carried out. Nearly everywhere too much stress is laid on the isolation of patients; indeed in some areas this is the sole measure of control employed. The legislation too in general dates back to before modern ideas on leprosy and is too restrictive in character in some areas; by contrast however there is no legislation at all.

Isolation in special leprosaria—the participants in the seminar were agreed—as a method of leprosy control suffers from serious disadvantages. It leads to the concealment of cases because of the fear of compulsory confinement it engenders. It involves heavy expenditure on the leprosaria that could better be devoted to more rational methods. It casts a stigma upon and leads to the disintegration of the patient's family, making social readjustment more difficult. It discriminates unjustly and inhumanly against one class of ill persons with the effect of making them appear to be outcasts and rendering their rehabilitation into society impossible or next to impossible. And it perpetuates popular prejudices against leprosy. It should therefore be abolished. Hospitalization in special institutions being restricted to cases where there is some special social or medical indication. In its stead there should be effective control of foci of infection through treatment of all sufferers from the disease and close surveillance of contacts.

Mass treatment is only feasible where the whole population or thereabouts can be regarded as contacts and is consequently not a method of control that is applicable in the Americas. The seminar preferred what it called extensive ambulatory treatment, meaning thereby outpatient treatment of all known patients with the aim of rendering them bacteriologically negative in the minimum time so progressively reducing the opportunities for spread of the disease. This treatment depends on the existence of drugs of known action and tolerance and requires for its success that all available resources be employed, especially in the rural areas to ensure that no focus of infection is left and no patient untreated. Such a programme will

need the full support of the authorities as it must given the characteristics of leprosy be a long term one and it must be flexible and adapted to the country in which it is carried out

Direct contacts should be subject to constant surveillance and placed under treatment the moment they are found to have contracted the disease. The new born should be kept away from foci of infection in children's homes or the like. There is no need for special institutions for the care of dependants of those found to be infected as isolation should be abolished. On the question of chemoprophylaxis for contacts the seminar was divided there being in its view insufficient evidence for a definitive opinion some participants thought chemoprophylaxis necessary for those persons who had been in contact with open cases others felt that proper trials should precede the introduction of any such measure.

The seminar recognized the importance of increasing resistance to leprosy although there was no unanimity of opinion about the value of the methods used such as BCG vaccination and lepromin. One view about BCG was that it should be employed although years would be required before any definitive opinion could be expressed on its merits or demerits because of its value in tuberculosis and its possible stimulating powers on the body's defences against leprosy. Another view was that there was no justification for using BCG until its value was demonstrated. All were agreed that its use deserved and should be given further study.

Should the staff engaged on leprosy control form part of the public health services or be a separate body? The seminar agreed that the former was the better solution amalgamation increased the scope and vigour of the programme reduced costs and facilitated co-ordination with other public health activities. Those who were in charge of the leprosy campaign should be properly trained special training courses should be launched for the subordinate staff and the very important psychological aspect should be given due emphasis. Leprology should receive increased attention in the medical

schools closer contact being desirable between the leprosy services and the departments of skin diseases preventive medicine and neurology. Institutions both public and private should support and encourage research into leprosy. Health education is an integral part of any programme for the control of disease its importance in leprosy needs no stressing. Legislation on leprosy should be included in the general legislation on communicable diseases not enacted separately and given undue prominence. All co-operation by private organizations in the task of control would be welcome.

Inter Regional Leprosy Conference at Tokyo

A WHO Inter Regional Leprosy Conference was held in Tokyo in November 1958²⁵. It was attended by participants from the South East Asia Eastern Mediterranean and Western Pacific Regions as well as by representatives of eleven non governmental organizations.

In any country with a leprosy problem the Conference agreed a preliminary investigation and a pilot case finding and treatment programme are necessary the latter normally being started in a demarcated area. An epidemiological survey requires adequate expert staff and other facilities and it was suggested that countries might wish WHO to assist in conducting such a survey. Bacteriological examination should be carried out on every leprosy case where practicable. Doubtful cases should be examined further by qualified personnel but treatment should not be withheld pending confirmation of the diagnosis. Each country should revise its classification of leprosy in accordance with the principles laid down at the Seventh International Congress on Leprology held in Tokyo just before the Conference.

The Conference agreed with most of the views of the South American seminar on leprosy control about the organization of leprosy control services but felt that while progressive and complete integration into the general public health services was desirable as an ultimate aim a special service

was needed in the early stages attached to the directorate of health services. A minority also expressed the opinion that in certain stages of leprosy control and in special circumstances some form of specific legislation might be found necessary.

The Conference discussed principles of treatment. In mass leprosy control campaigns an inexpensive form of therapy must be used which can be administered safely by auxiliary personnel. At present the only drug which fulfils these requirements is DDS given orally or by repository injection. The choice of the mode of administration will depend on local circumstances either mode having its advantages and disadvantages but both being equally effective. Treatment must be taken to the patient, mobile teams being useful for this purpose. Only if patients prove to be intolerant of or resistant to DDS is there any justification for special drugs and then they should be administered under close medical supervision preferably in an institution. The Conference recognized the need for research directed towards finding more effective drugs of better tolerance and longer repository effect.

The length of treatment depends on a decision as to when an active and therefore dangerous case becomes inactive. The Conference agreed on certain criteria by which inactivity might be judged. No bacilli should be found over a period of at least six months by routine methods of examination in smears from the skin and nasal mucosa. There should be no visible infiltration of the lesions, i.e. all lesions should have become flat for at least six months. No alteration of texture or colour should have occurred in the lesions and no erythema should have appeared for the same period. No fresh lesions or extension of existing lesions should have taken place. Anaesthesia should similarly have remained stationary and there should have been no nerve tenderness or pain for a period of six months. The Conference recommended that treatment of indeterminate or tuberculoid (including maculo-anaesthetic and neuritic) cases should go on for two years or until all signs of activity have ceased for eighteen

months whichever is longer. Treatment of lepromatous and border line (dimorphous) cases should go on for at least two years after all signs of activity have ceased.

The Conference endorsed the conclusions of the seminar on the undesirability of isolating leprosy patients. Institutions can play an important part in control programmes by providing facilities for treatment of patients in reaction and infectious patients admitted on a voluntary basis and they may be centres of research, education, special surgery and vocational training. Patients with acute complications or incidental illness should otherwise be treated in general hospitals.

On other aspects of prevention too the Conference was in accord with the seminar. The role of BCG is as yet not established and chemoprophylaxis for contacts has still to be proved to be of value. Further research is therefore advisable. One point in prevention cannot be over-emphasized in any leprosy campaign: the danger of open cases coming into intimate contact with healthy members of the community particularly children.

Shortage of specialized medical staff should not deter health administrations from carrying out leprosy control work which is usually largely done by trained auxiliary personnel. The director of a programme should however be versed both in public health and in leprology. The study of leprology should be linked with other scientific disciplines and the basic research worker should be encouraged to take an interest in its problems. Medical practitioners and students ought to learn more about leprosy tuition during the student years and refresher courses afterwards being valuable.

Knowledge about the main facts of leprosy should be as widely diffused as possible and propaganda should — the Conference stressed — be directed not only at the general public but at doctors, health workers and patients. There should be no hesitation in stating that leprosy is a curable disease and it should be emphasized that early treatment may prevent deformity which is itself usually correctable. In this

way the fear of leprosy which is rooted in the idea that it is incurable and in its association with deformity will be allayed and leprosy patients will no longer be regarded with loathing and dread

The Conference also discussed the assessment of the results of leprosy control favouring the evaluation indices suggested at the Seventh International Congress on Leprology and dealt finally with the important subject of the social physical and psychological rehabilitation of leprosy patients. It is particularly necessary to convince the public that leprosy is not a disease apart and that patients can be accepted and rehabilitated within the community. Deformities that cannot or have not been prevented can be improved or corrected by physiotherapy in conjunction with orthopaedic and plastic surgery. For this purpose each country should have at least one centre where specialists can provide teaching facilities and consultant services for surgeons and physiotherapists in the area. Surgical services can be attached to the general hospitals and leprosy centres the essential requirement being that the surgeon should have received special training and that he should be aided by auxiliary personnel who can prepare the cases and follow them up. Occupational facilities should be provided

CCTA/WHO Leprosy Conference in Africa

A Leprosy Conference was held in Brazzaville in April 1959 under the joint auspices of WHO and the Commission for Technical Co-operation in Africa south of the Sahara (CCTA)²⁶. In the view of the Conference DDS is the drug of choice in mass treatment because it is well tolerated effective and cheap. The question of whether it should be administered by injection or in tablet form depends on local geographical conditions the health services the qualifications of the staff giving the treatment the financial situation of the country and social and psychological factors. The discovery of new preparations may however affect the choice

dosage and periodicity of treatment. If tablets of DDS are used they should as far as possible be swallowed in the presence of the distributor. A standard form of mass treatment is desirable for campaigns in Africa and should only be departed from in cases found to be resistant to or intolerant of DDS. The Conference accepted the criteria formulated by the Tokyo Conference for the determination of inactive cases and endorsed the schedule of treatment based on those criteria.

The teaching of leprology is of particular importance in Africa and African medical students should all learn about a disease which presents many urgent problems in their continent. It should be taught chiefly in courses of dermatology but full attention should be paid to the neuropathies and the public health and social medicine aspects. At present a period spent in practical work would be more useful in dealing with the problems of leprosy in Africa than time spent on a specialist degree in the subject for the Conference was well aware of the difficulties in getting doctors to specialize in leprology. Careful training is required for the paramedical personnel as well as for the medical personnel and laboratory technicians qualified physiotherapists and occupational therapists are essential members of any leprosy control team.

In each African country the Conference felt there should be a special leprosy service directed by a qualified leprologist with adequate training and experience in health administration. Before a campaign is launched a propaganda drive should prepare the population for the methods to be used and convince them of the importance of bringing leprosy under control. A preliminary survey is needed to assess the extent of the disease the size of the staff and the amount of equipment and supplies required. A country which has not yet got an adequate health service should first establish a minimum service without which no campaign undertaken with international assistance can be satisfactorily carried out even in a small area. The decision whether a campaign should be general or limited depends on the

²⁶ Unpublished document CCTA/WHO Lep Conf/16 R 2

Leprosy in History

The word leper comes from a Greek word meaning scaly in one form or another this word is found throughout the Aryan languages with the same meaning something peeling off. In ancient Greece the term was used to mean psoriasis. Elsewhere in India and Egypt as well as in the Israel of the Bible it is uncertain far it was used to mean leprosy in the modern sense far other skin diseases characterized by scaling. Medical descriptions corresponding to the disease as known at present do not appear before the Middle Ages in Europe or the seventh century in China.

Even in the nineteenth century the greatest confusion existed about leprosy. Medical dictionaries in France, for example, would refer their readers to the article on elephantiasis for a history of the disease and point out that the term leprosy had been applied to pellagra, the *antrax* of the Greeks and the elephantiasis of the Arabs as a degeneration or a modification of the disease. In English dictionaries it is generally found under elephantiasis and not under leprosy.



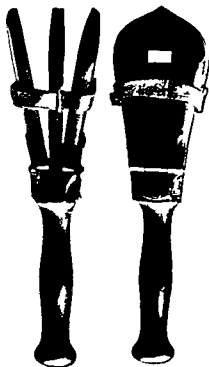
Lepe confessing Th priest holds handk rchu fo r his mouth
to d ntag on. VV h tury

Arabs and in the sixteenth century to syphilis this being
as known up to that time The description of leprosy in
the article under leprosy being devoted only to the past

En 2^{de} ugen glider ful/
Dro omme gi' ned/ sytten vil

Ja, natürlich ich werde gehen
 Und Sie werden mal sehen

← Phys ian xamin g l pers l per hous Ea ly XVI h century



R titles (open on the left, closed on the right) used by lepers in medieval Germany



Woodcut of 1493 commemorating Maundy Thursday in Nuremberg
the day annually set aside for hospitality to lepers

subsidence of a centuries old epidemic it is hard to say. One interesting but unproved theory attributes the decline in leprosy to the increase in tuberculosis. *Mycobacterium tuberculosis* shouldering out its less hardy relative *Mycobacterium leprae*. But the opening up of other parts of the world showed that if leprosy was a dying disease in Europe it was far from being so in Africa, in South East Asia or in Central and South America.

* The modern history of leprosy may be summed up in a few words. The causative organism was discovered in 1873 and the disease was realized to be a communicable one like many others and a great deal less infectious than many. The introduction of chaulmoogra oil in 1834 and of the sulfones in 1941 has made it a curable disease. And finally the disfigurements and deformities which were once regarded as an inevitable concomitant of leprosy have come to be seen as preventable or in many cases correctable by surgery.

* Leprosy is the perfect example of the disease which inspires an irrational fear arousing a feeling of guilt. The ambivalent attitude is at the bottom of medieval treatment of the leper. He was generally cast out to die in the world segregated in a leper house or secluded at home by his relatives. In the twelfth century however an outburst of sympathy for

Christ's Poor encouraged the Church to nobles washing the feet of lepers and embracing their diseased bodies. Leper or leprosy houses were common foundations in the Middle Ages and this has provided one of the arguments for the thesis that leprosy was then widespread. But many of these foundations exist only in name. Chronic skin diseases were indiscriminately lumped together as leprosy and those suffering from them confined to leper houses, beggars and paupers often sought and found a refuge in them and not a few remained empty or nearly so. The prevalence of true leprosy cannot therefore be readily deduced from the number of such leper houses although other sources indicate that the disease was relatively common throughout the Middle Ages.

* Leprosy probably reached its peak in Europe between AD 1000 and AD 1400 thereafter declining till it died out in most European countries in the eighteenth century or a little later. Whether this was due to the measures taken against the disease to the general improvement in hygiene or to the natural

health service staff already available if a pilot project is decided upon training of staff can go on concurrently and the pilot project can afterwards be used as a demonstration area. In a country with a high prevalence rate favourable geographical conditions and sufficient funds mobile teams will secure more regular attendance for treatment than fixed centres and they complement out patient clinics especially when these are few. Leprosaria have now lost their *raison d'être* but should be kept for specialized treatment where this is necessary. The development of ambulatory treatment should not be regarded as a reason for reducing or withdrawing aid to these institutions. In addition to the leprosaria all the hospital units in the country are needed for the treatment of acute cases i.e. those suffering from reactions or intercurrent illness.

Leprosy work should be integrated into general health work but integration cannot start without an adequate rural health unit coverage. Case finding will still have to be carried out for a long time by mobile survey teams who should take advantage of all mass examinations of the population as for example during jaws campaigns. Limited zones should be established for the evaluation of the results of the leprosy campaigns suitable evaluation indices being those adopted by the Seventh International Congress on Leprology. Among the problems to be settled in any campaign is the important one of co-ordination between neighbouring countries in the treatment of migrant patients and exchange of information on seasonal movements of population.

The Conference was in full agreement with the Tokyo Conference's views on the serious disadvantages of compulsory segregation of leprosy patients. Voluntary isolation of contagious cases is however a useful measure to be recommended and encouraged. Legislation on communicable diseases can be supplemented by special orders on leprosy measures. In particular governments should empower doctors to recommend that infectious patients under their care should not follow certain occupations such as those of midwife nurse or teacher. Laws should be

reviewed in the light of present knowledge of leprosy and those retained applied liberally. One compulsory requirement is desirable: the whole population of an area should be required to attend during survey visits—visits which are in any case justified by the existence of concomitant endemic diseases.

Separation of children from their leprous parents is not a feasible measure in Africa both because of the lack of suitable institutions and because a high rate of infant mortality tends to result moreover the psychological effects are often disastrous. In leprosaria they should be separated for the night only from their lepromatous mothers. Breast feeding should not be interrupted. Chemoprophylaxis for infants should begin only when the infants are weaned as the milk of mothers on sulfones may be sufficient to protect while the babies are still at the breast.

The Conference prepared a classification of disabilities in leprosy and discussed the organization of physiotherapy and occupational therapy prevention of disabilities orthopaedic and surgical rehabilitation and the reintegration of leprosy patients into social life in the special conditions obtaining in Africa. More attention should be paid to establishing departments of rehabilitation in leprosaria.

Expert Committee on Leprosy (1959)

A WHO Expert Committee on Leprosy met in Geneva in August 1959 and discussed various problems that had arisen in the leprosy campaigns.²⁷

Lepromatous patients are generally agreed to be the most infectious. But the high prevalence rate of leprosy combined with a nevertheless low prevalence rate of lepromatous cases in certain countries cannot be explained on the assumption that lepromatous cases are the only sources of infection. Evidently the borderline group the reactional tuberculoid and some indeterminate cases are to some degree infectious. The evidence suggests that tuberculoid cases are not normally infectious but the Committee s

view was that all non lepromatous patients should be subjected to a careful bacteriological examination

The lepromin reaction is of established value as a test of individual reactivity to the *Mycobacterium leprae* it furnishes a criterion for the classification of cases and an indication of the prognosis in patients and of relative resistance in contacts. Several problems are raised by the need for standardization for the reaction. The lack of specificity of terminology causes much confusion lepromins bacillary lepromins leprolins and Dharmendra antigens all being mentioned in the literature. The Committee sought to clarify the situation and made recommendations about purification of the antigens standardization for the Mitsuda reaction and the reading of the reactions.

While the methods to be adopted for anti-leprosy campaigns will differ according to the prevalence and the economic and social conditions of each country wherever a campaign is started it is essential to establish a central leprosy service directed by a leprologist with knowledge of public health administration. Ultimately however the leprosy service should be integrated within the general health services. The campaign need not await the arrival of highly qualified personnel but can be started with a limited paramedical staff and extended as more personnel is recruited.

Leprosy campaigns usually have three phases attack consolidation and integration. The attack phase is one of case finding and treatment case finding being carried out by mass examination house to house visiting contact tracing or the examination of previously selected groups of the population according to the situation in the country. Case holding is the most important part of the consolidation phase as leprosy is a chronic disease and patients have to be treated for years. This may be achieved by mobile circuits out patient clinics skin clinics (fixed or mobile) leprosy villages survey health education and treatment (SET) units working in the neighbourhood of a general hospital dispensary or health centre or working groups of the kind estab-

lished in Brazil directed by a leprologist who supervises the work of non specialist physicians and health workers. In the integration phase health centres assume the responsibility of treating leprosy cases. At first the specialized leprosy staff looks after case finding and re surveys but when integration is complete this work is done by the general health services.

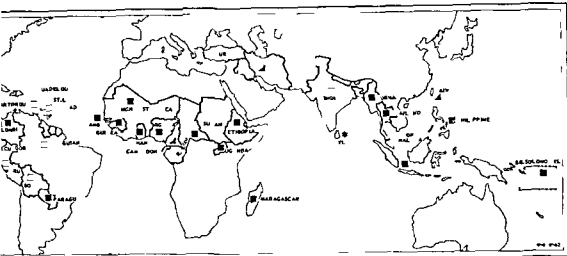
Pilot areas should be established to evaluate results in countries where the campaigns cover the whole of the territory. In others they are the only effective way of starting campaigns the pilot projects being extended gradually.

On the subject of BCG vaccination the Committee agreed that this might be of benefit to healthy contacts. Although its efficacy in the prevention of leprosy has not been conclusively proved because most of the experiments have been on too small a scale and done without proper statistical support and many have been done too recently to permit assessment of the results there is no objection to the use of BCG vaccination in leprosy campaigns in countries with the resources to carry it out. The Committee suggested a number of investigations that could be carried out to test the effectiveness of BCG in leprosy control particularly in conjunction with the tuberculosis investigations in India.

SOME INTERNATIONAL LEPROSY PROJECTS IN PROGRESS

On the recommendation of the UNICEF/WHO Joint Committee on Health Policy in May 1953 leprosy was included among the diseases for which the two international agencies could provide joint assistance to countries.

Direct assistance by WHO had already started with the provision of consultants to Burma and Ceylon in 1951 and to Ethiopia in 1952 to co operate with the health authorities in preliminary surveys of the leprosy situation and in the planning of leprosy programmes. Joint programmes with UNICEF some of which are described below followed a little later the principle on which



Project completed ■ Project in progress ▲ Planned project

collaboration between the two agencies is based being that UNICEF under its agreement with governments furnishes the supplies required while WHO studies and approves all plans of programmes for which countries request supplies from UNICEF WHO is also responsible for sending health experts at the request of governments to help draw up plans of operation for health programmes

Nigeria

The Nigerian leprosy campaign is one of the oldest leprosy campaigns in Africa. International assistance started with the visit of a WHO consultant in 1952 who estimated that the number of cases in the country was 600 000.

In 1953 the Nigerian Government requested WHO for advice on leprosy control and for fellowships in this field. In 1954 the first plan of operations was signed by the Nigerian Government WHO and UNICEF the main objective being to bring about 100 000 leprosy patients under treatment in a three year period.

In the following year the political evolution

in Nigeria caused some modification in the first plan of operations and new plans were drawn up for the three territories of Eastern Northern and Western Nigeria.

Eastern Nigeria

The leprosy campaign began in Eastern Nigeria in 1947 with the segregation of contagious leprosy cases and the creation of 31 out patient clinics for ambulatory treatment of "closed" cases. In that year the number of treated patients reached the figure of 13 809.

The total number of registered patients rose in 1958 to 36 540 the number of patients hospitalized and discharged since the beginning of the campaign is over 16 600. In the last quarterly report received for 1959 emphasis was laid on the fact that between 1939 and 1959 there had been a reduction in the leprosy prevalence in the Owerri Province from 50 per 1000 to 7 per 1000.

North in Nigeria

One of the most spectacular mass campaigns against leprosy has been launched in Northern Nigeria. The campaign began in

1952 with the treatment of about 17 000 patients In January 1959 the number of treated patients reached the figure of 179 837 Only 6000 patients are isolated in institutions This campaign has been carried out by para medical personnel supervised by the campaign director (a medical officer) and the general practitioners in charge of the different divisions and districts

Western Nigeria

The progress of the leprosy campaign in Western Nigeria is not so spectacular In December 1957 the number of patients under treatment was only 8904 and of these 3027 were isolated in different institutions

French Equatorial Africa ²⁸

A leprosy campaign began in 1953 in French Equatorial Africa In 1955 the French Government requested international assistance and with the technical advice of WHO and important supplies from UNICEF 193 mobile circuits were organized to cover the whole area

The estimated number of cases in this area is 150 000 and the progress of the leprosy campaign can be seen from the following table

Y	R g l d P t	P t t m t
1953	54 652	5 988
1954	93 045	76 830
1955	120 008	80 130
1956	136 150	113 440
1957	140 414	121 542
1958	145 827	—

French West Africa ²⁸

The leprosy campaign in French West Africa is one of the biggest in the world International assistance by WHO and UNICEF began in 1955 and a plan of operations was signed by the Government WHO and UNICEF in September 1957

As in French Equatorial Africa the campaign is carried out by mobile circuits of which about 300 have been established All

existing leprosy centres in the area have been used for the campaign Progress in the discovery of new cases has been spectacular but the provision of regular treatment for registered patients has lagged behind because of political developments and only about 50 % of the patients can be given regular treatment The progress of the campaign can be seen from the following table

Y	R g l d P t	P t t m t
1950	103 613	34 080
1951	118 823	46 000
1952	150 377	52 773
1953	175 586	81 422
1954	201 279	103 369
1955	232 917	127 077
1956	283 012	124 000
1957	293 000	122 687
1958	304 865	162 142

The estimated number of cases in the area is 500 000

Ghana

The Government of Ghana started the leprosy campaign without international assistance and made remarkable progress In 1957 a plan of operations was signed by the Government WHO and UNICEF WHO providing consultants and UNICEF important supplies drugs and transport In 1952 the number of treated patients was only 5592 but by the end of 1958 26 017 patients were under treatment About 12 000 patients have been taken into institutions discharged and followed up

Uganda

International assistance to the Uganda leprosy campaign began in April 1956 The establishment of the campaign involved very special measures in view of the scattered population in Uganda As it was impossible to establish regular mobile circuits a large part of the leprosy patients were concentrated in settlements to ensure regularity of treatment and supervision The number of registered patients in the territory is 50 000

²⁸ The series of illustrations and political entities with which the leprosy campaign was started.

DIFFERENTIAL DIAGNOSIS OF LEPROSY



The diagnosis of leprosy is generally easy especially when it is sufficiently advanced for deformities to be present. The typical leonine faces of advanced lepromatous leprosy (1) is known even to some non medical people and workers in the field should recognize easily the plaques of tuberculoid leprosy (2) and the hypopigmented macules of indeterminate leprosy (3). The more difficult succulent borderline lesions (4) are usually diagnosed with difficulty because of the presence of anaesthesia and of *Mycobacterium leprae* in smears from the skin lesions.

Nevertheless the diagnosis may be difficult. Flat hypopigmented indeterminate macules are often confused with pityriasis alba facie which is characterized by small hypochromic patches on the face and is very common in children. It is also possible to confuse indeterminate leprosy macules with different kinds of epidermomycoses eg



pityriasis versicolor (5) or ring worm (6) These diseases are common where leprosy is common and often co exist with it The lesions of mycosis however very often have blistering edges and surface desquamation where as those of leprosy have a smooth surface and no blisters and the former show special preference for the hairy skin which is not commonly affected in leprosy Anaesthesia is pathognomonic of leprosy there is never any in mycosis In doubtful cases anhidrosis may be detected by the iontophoresis apparatus with pilocarpine or acetylcholine



5



Leprosy macules may be confused with certain hypopigmented macular lesions of yaws (7) The differentiation is important because the diseases co exist in many countries in some cases the onset of leprosy follows yaws The presence of anaesthesia or anhidrosis establishes the disease as leprosy In yaws there is commonly desquamation from the surface of the macules

The changes of pigmentation of certain nutritional diseases (pellagra and other avitaminoses) or parasite diseases (onchocerciasis) may resemble indeterminate leprosy

Tuberculoid leprosy may also be simulated by the epidermo mycoses The patient in 8 was diagnosed as having leprosy but the presence of similar patches in the armpits (9) showed the diagnosis to be ringworm Certain forms of skin tuberculosis such as lupus vulgaris may also resemble tuberculoid leprosy So too cutaneous paratuberculosis e.g lymphogranuloma benignum especially the so called nodular sarcoid may closely resemble certain forms of



7

reactional tuberculous leprosy (10). This resemblance is not limited to the morphology of the skin lesions. Lymphogranuloma benignum absorption of the bone occurs in a way very similar radiologically to that of leprosy and the histological structure in both diseases is often distinguishable. Here again the important diagnostic point is the presence of anaesthesia or the other neurological signs and symptoms almost always present in leprosy but not in sarcoid.

Some lesions of erythema occur and resemble tuberculous leprosy; the lower lesions (11) do while the upper ones resemble syphilis. Anaesthesia and thickening of the plantar nerves confirmed the diagnosis as leprosy; however. The presence of these neurological signs and symptoms serves to distinguish leprosy from certain forms of chronic lupus erythematosus (mainly the facial type); the histological picture in both diseases being at times completely similar. Superficially the diagnosis may not be easy between the leprosy of 12 and lupus erythematosus.



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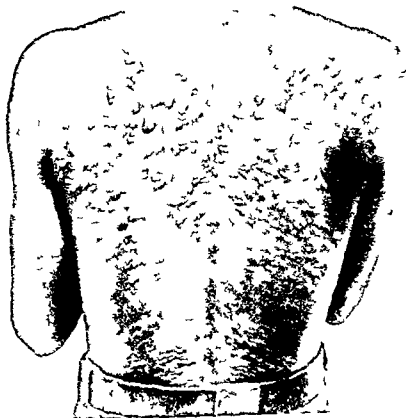


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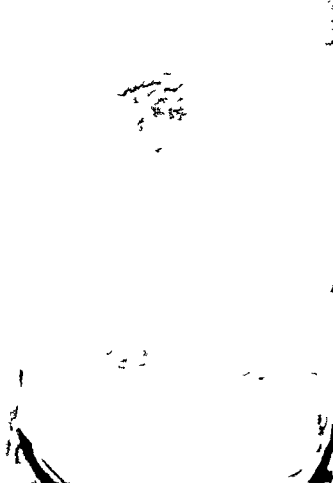


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1

15

countries. It is relatively frequent for leprosy and yaws to occur together in the same patient. It is possible for the wrong type of leprosy to be diagnosed especially in patients with gangosa a lesion of the nasal bones characteristic of late yaws (18) but resembling in some ways the typical nasal lesion of lepromatous leprosy. In yaws however the lesions are in the bones and the bony palate is frequently involved. In lepromatous leprosy the lesions are in the cartilaginous septum and the palate is not involved only the soft palate. In advanced cases the nose generally has a very peculiar tubercle appearance (19) quite different from that of yaws. A bacteriological examination will clinch the diagnosis. Laboratory facilities are available and the lepromin test, which is negative in lepromatous leprosy may be helpful. It is of course to confuse lepromas with osteoclasia nodules but these are localized principally on the iliac crest, and bacterio-



Lepromatous leprosy is the most characteristic form of the disease the easiest to recognize and the most unlikely to be confused with other diseases. But mistakes are not uncommon. The patient in 13 was in a leprosarium for months before she was found to have not leprosy but multiple neurofibromatosis (von Recklinghausen's disease) which may resemble some forms of lepromatous leprosy (14) but does not have typical signs such as alopecia of the eye brows. Bacteriological examination would have given the correct diagnosis immediately as abundant bacteria are always found in lepromatous leprosy. Late yaws (15) at first sight not unlike lepromatous leprosy can similarly be distinguished. Certain lesions of early yaws such as the nodular variety found on the knees (16) resemble lepromas which also are often on the knees (17). At this stage of leprosy there are usually other cutaneous or neurological manifestations however and bacteria can be found in the lesions. As in tropical





les on which is ce tral i syrin
gomyela pe phe l in leprosy
and dissociated se s ry loss
occ sin sy gomyela wth loss
of s ns bly to p n d heat but
no loss of sensbly to touch
whe as i leprosy it is always
poss ble to detect some alte ation
se s bly to touch and i the
ad a ced stages se s bly to
to ch s completely lost.

logical investigation shows *Onchocerca volvulus* and not *Myco leprae*

The neural form of leprosy is responsible for the characteristic deformities (20) of the disease All the peripheral nerves may be affected but the ulnar lateral popliteal median and facial are most commonly so The nerve trunks are usually painful to the touch and often they are thickened palpable even visible (21) This may help to distinguish the facial paralysis (22) or lagophthalmos (23) of leprosy from other forms of facial paralysis The claw hand of leprosy (24) may resemble that of Dupuytren's contracture which is not rare in countries where the prevalence of leprosy is high but the latter may be diagnosed by the almost invariable absence of anaesthesia nor will there be any thickening of the ulnar nerve Other peripheral nerve lesions may simulate leprosy but the neuritis of leprosy is usually characterized by disturbances of sensibility special preference for certain nerves thickening of the nerve trunks greater frequency of trophic ulcers and absorption of the bones Syringomyelia is the most difficult disease to distinguish from the neural form of leprosy Not only is it uncommon however but there is no thickening of the nerve trunks as in leprosy the topography of the anaesthesia is dependent upon the site of the

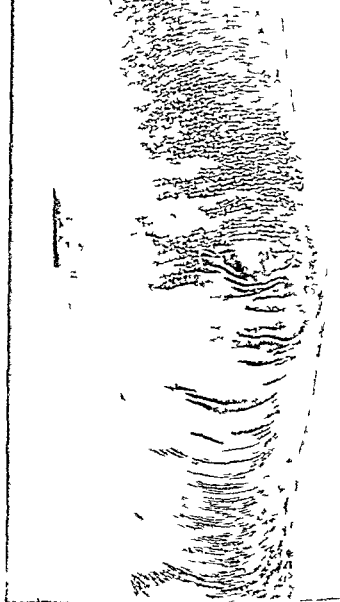


TABLE 4
SOUTH EAST ASIA AND THE WESTERN PACIFIC
LEPROSY PATIENTS UNDER TREATMENT

Co try t t ry	P t t	P t t t m t
A l		
N S th W l	3 660 500	6
N th T t ry	3 500	400
Q ee sl d	1 396 700	41
South A tral	686 200	4
T m	328 000	—
W t A t l	00 000	250
B m	20 000 000	33 372
C yl	9 179 200	3 140
Ch (Taw)	9 664 000	1 907
F j	345 700	57
H g K g	2 583 000	2 90
I d	64 166 000	26 7,6
J	91 065 000	10 841
N	4 3,0	47
N th l d N w G	342 600	781
P —New G	1 779 100	2 272
Phil p	23 122 700	3 701
P ly	69 30	280
Ry ky l d	637 000	1 2 0
S g	14 4 000	3 950
Th l d	77 811 700	70 506

a major international health problem one which falls most heavily on the communities that are least able to bear the economic burden which it imposes or to devote their resources to ways and means of overcoming it

Leprosy affects the working capacity of a patient in many ways. The fear and prejudice it arouses cause society to cast out not only patients incapacitated by leprosy and unable to work but also those who though affected are still capable of doing some work. Leprosy is a chronic disease but acute reactions e.g. neuritis and fever can appear in the course of the disease and during such reactions the patient is unable to work and should be hospitalized. Finally the disease is characterized by the frequency of disabilities and deformities which diminish the patient's working capacity to a varying degree.

In spite of the world wide awareness of the problem it is surprisingly difficult to obtain accurate information about the frequency and type of deformities current in the various endemic areas. The frequency of deformities and disabilities varies greatly from one country to another in some countries regions exist in which disabilities are more frequent and serious and appear in young people. On the ground that it would be very useful to obtain accurate information about the frequency of deformities and disabilities in various countries and in various types of the disease the leprosy unit at WHO Headquarters sent to the governments interested in the problem the following scheme of classification of deformities with a request for the relevant information.

*Scheme of classification for physical
disabilities resulting from leprosy*

A Hand

- Grad 1** — Aesthesia to pain
2 — Mobile thumb d. Useful thumb
3 — Transverse paralysis of fingers
 d thumb or fingers only b t
 with no tracture
4 — Partial absorption of the fingers b t
 with useful length remain g.
5 — Gross absorption. Stumps o ly
 left

THE ECONOMIC ASPECT OF LEPROSY

Leprosy is a heavy economic burden to its victims their families and society not just for a brief period of time but usually for many years and even until the death of the victim. While modern therapy may shorten the period of active disease recovery does not always bring about an improvement in the physical emotional and social effects of the disease. The prevalence of leprosy is greatest in the less developed poorer parts of the world. Leprosy therefore constitutes

International assistance by WHO and UNICEF began in 1954 and the plan of operations was signed in 1956. This plan is based on case finding by mobile skin clinics and the integration of the treatment of the patients discovered with that provided by the rural health units. The project started with two mobile skin clinics and now in the second expansion phase of the programme an increase to 10 mobile skin clinics is envisaged to cover a population of more than 8 million persons by the end of 1961.

The number of registered cases increased from 10 234 in 1956 to 13 201 in 1958. The estimated number of cases in the country is about 20 000.

Paraguay

The national leprosy programme in Paraguay began in 1948 with voluntary ambulatory treatment in out patient clinics. In seven years 953 new cases have been discovered and put under treatment.

In October 1955 with international assistance by WHO and UNICEF treatment based on case finding began in selected groups of the population (59.4% of the population have been examined). After only 30 months of the new policy 923 new cases have been registered and put under treatment. All the 1876 patients discovered are under regular treatment which is integrated with that provided by the general health services of the country.

The plan of operations also envisaged the regular surveillance of the contacts of leprosy patients and the protection of lepromin negative contacts of lepromatous patients by BCG vaccination.

* * *

Leprosy control with international assistance is also developing in the following countries and territories: Ceylon, Colombia, Ethiopia, French Cameroons, Gambia, Iran, Madagascar, Sierra Leone, Solomon Islands and Turkey.

Some idea of what still remains to be done can be gained from a comparison of the numbers of cases now under treatment in

TABLE 3 AFRICA LEPROSY PATIENTS UNDER TREATMENT

Country or territory	Population	Patient under treatment
Basutoland	639 900	306
Belgian Congo	13 000 000	249 546
Cape Verde Islands	20 000	13
Comoro Islands	200 000	424
French Equatorial Africa	4 875 700	120 000(?)
French West Africa	17 504 000	162 149
Gambia	266 500	3 000
Ghana	4 118 450	26 017
Madagascar	5 065 400	25 172
Mali	613 900	43
Mozambique	5 647 000	59 878
Nigeria		
Eastern Region	7 218 000	31 790
Northern Region	18 000 000	166 433
Northern Rhodesia	2 300 000	6 763
Nyasaland	2 500 000	7 761
Sierra Leone	2 000 000	4 260
Somaland Protectorate	650 000	3
Southern Rhodesia	2 811 500	1 794
Spanish Guinea	180 000	4 154
Tanganyika	8 748 500	4 700
Togo	1 700 000	19 000(?)
Uganda	5 700 000	30 000
Union of South Africa	14 418 000	1 511

Th is a ea still e isted as a pol t cal ent y when th leprosy cam pa gn was started

countries and territories of Africa, South East Asia and the Western Pacific (see Tables 3 and 4) and the prevalence estimates given in the section 'Extent of the problem' (see page 8).

treatment of leprosy

Henceforth be dead to the world and live in God
his ecclesiastical injunction (see page 4) reflects an
attitude to leprosy which has lingered on until comparatively
recent times. The application of modern hygienic principles
and especially the advent of successful chemotherapy
have changed the picture completely however and
have obliterated the outlook for the leper enabling him to be
treated in the same way as any other sick person and to
resume his normal place in society when cured.

All kinds of treatment have been tried in leprosy from
castor oil and mad hatter's arsenic and mercury. Chaulmoogra
oil a native remedy on the west coast of India
was first used in medicine in 1854. It became the mainstay
of treatment alone or in combination with other drugs such
as resorcinol and camphorated oil. Unfortunately the relapse
rate was high and its effectiveness was limited chiefly to
early lepromatous and non lepromatous cases.

The search for more effective drugs received fresh
impetus with the discovery that certain derivatives of
diphenylsulphone exert a bacteriostatic action on the
causative organism of leprosy 4,4'-diaminodiphenylsulfone
(DDS) was synthesized by Fromm and Wittmann as long
ago as 1908 during research in dye chemistry. However
nobody took any interest in this compound until 1937 when
Buttle et al reported that it was effective against streptococcal infections in mice.

In 1937 Tillitson obtained the first soluble sulfone derivative the sodium di-dextrose sulfonate of diaminodiphenyl
sulfone. Thus as given the name Promin and was
the first sulfone compound used in human therapy. Three
years later Feldman Hinshaw and Moses published a
preliminary report on the effect of Promin in experimental
tuberculosis in guinea pigs and Rust Block and Hamon
reported the inhibitory effect of sulfone drugs on avian
tuberculosis. Cowdry was the first to use sulfones in the
treatment of rat leprosy but the results were not so good
as in tuberculosis.

Promin was used for the first time in human leprosy at
Carville (USA) in 1941 by Faget et al their first report on
this trial being published in November 1943. In spite of
the encouraging results only a few papers on the subject
appeared in the following two years.

During the Fifth International Congress on Leprology
held in Havana in 1948 more than 30 papers were presented
about the effects of sulfone drugs on leprosy and the opinion
was expressed in the report of the Committee on Therapy
that the sulfones are the present drugs of choice for
the treatment of leprosy.



1 Before treatment with DDS
2 After treatment with DDS

B Feet

- Grade 1 — Anaesthesia
 2 — Trophic ulceration (present or past)
 3 — Paralysis (dropped foot or claw toes)
 4 — Partial absorption of the foot (up to one third of surface area of the sole lost)
 5 — Gross absorption (more than one third of the foot lost)

C Face

- Type 1 — A permanent mark or stigma of leprosy not amounting to disfigurement (loss of eyebrows deformity of the ear)
 2 — Collapse of nose
 3 — Paralysis of the eyelids including lagophthalmos
 4 — Loss of vision in one eye or dimness of vision in both eyes (can count fingers)
 5 — Blindness

D Miscellaneous

- Type 1 — Gynaecomastia
 2 — Involvement of the larynx

Note For record purposes it is suggested that it be stated whether conditions under A B and D 1 are unilateral or bilateral

Information so far received about the frequency of deformities and disabilities makes it possible to affirm that over 15% of the total number of leprosy patients are affected the frequency naturally being much higher among patients in institutions than among patients receiving ambulatory treatment as generally patients with serious deformities and disabilities come voluntarily to the institutions

Disabilities and deformities are more frequent among males in certain regions the differences in frequency between the sexes is more significant than in other regions

The information received up to now is as follows

C	T i l					T i l				
	b	i	f	p	g	b	i	f	p	g
Brazil (Dr Diniz)	26	264				5	5			
						(patients from institutions only)				

C

	T i l					T i l				
	m b	f	p	en	z	m b	f	p	en	z
	i	g	d	h	disab	i	g	d	h	disab
Uganda (Dr Kinnear Brown)	3	130				34	4			
India (Dr Hemeryckx — Belgian Leprosy Centre Polambakam Madras State)	2	479				18	3			
Venezuela (Dr Convit)	8	286				16	4			
Martinique (Dr Montestruc)	6	85				16	0			
Spain (Drs Gay Prieto and Contrera)	1	867				15	4			

If it is taken for granted that patients with extreme anaesthesia are more liable to develop trophic ulcers and subsequent mutilations it can be accepted that at least 25% of the total number of leprosy patients need physical rehabilitation In other words there may be about 2.5 million leprosy patients throughout the world in need of special care so as to prevent or correct deformities and disabilities

The most frequent deformity is claw hand e g

	P					e				
	pat	i	w	h	d	pat	i	w	h	d
Brazil	33	3				16	4			
Uganda	16	4				10	8			
India (Madras)	10	8				4	9			
Venezuela	4	9				6	1			
Spain	6	1								

Treatment with sulfones in the early stages of the disease can prevent the appearance of deformities in a great number of cases Statistics received from Venezuela demonstrate this clearly among 1361 leprosy patients suffering from disabilities deformities appeared in 1168 cases before treatment and in only 193 cases after treatment had started However in the case of damage to the nerves it is evident that sulfone treatment cannot stop the progressive development of deformity

The cost of leprosy control is impossible to estimate it varies from one country to another and is related to the salaries of the medical and paramedical personnel engaged on the work Ambulatory treatment is the cheapest treatment the isolation of leprosy patients in institutions increases the cost of a leprosy campaign considerably

of leprosy

Hence it might be said to be dead to the world and live in God. His ecclesiastical injunction (see page 4) reflects an attitude to leprosy which has lingered on until comparatively recent times. The application of modern hygienic principles and especially the advent of successful chemotherapy have changed the picture completely however and revolutionized the outlook for the leper enabling him to be treated in the same way as any other sick person and to ensure his normal place in society when cured.

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				(patients from institutions only)	

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	mb	f	pe	i	g
	lg	rd	d	bil	l
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Martinique (Dr Montestruc)			685		160
Spain (Drs Gay Prieto and Contrera)		1	867		154

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P	T				
	lg	rd	d	bil	l
	cl	w	h	d	
Brazil					333
Uganda					164
India (Madras)					108
Venezuela					49
Spain					61

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t of leprosy

Hitherto be dead to the world and lie in God's ecclesiastical injunction (see page 4) reflects an attitude to leprosy which has lingered on until comparatively recent times. The application of modern hygienic principles and especially the advent of successful chemotherapy have changed the picture completely however and brightened the outlook for the leper enabling him to be treated in the same way as any other sick person and to secure his normal place in society when cured.

All kinds of treatment have been tried in leprosy from ashew nut oil and madder to arsenic and mercury. Chauliogra oil a native remedy on the west coast of India was first used in medicine in 1854. It became the mainstay of treatment also in combination with other drugs such as resorcinol and camphorated oil. Unfortunately the relapse rate was high and its effectiveness was limited chiefly to mildly lepromatous and non lepromatous cases.

The search for more effective drugs received fresh impetus with the discovery that certain derivatives of the yisulphone exert a bactericidal action on the causative organism of leprosy 4-4-diaminodiphenylsulfone (DDS) was synthesized by Fromm and Wittmann as long ago as 1908 during research in dye chemistry. However nobody took any interest in this compound until 1937 when Little et al reported that it was effective against streptococcal infections in mice.

In 1937 Tillman obtained the first soluble sulfone derivative the sodium di-dextro celsulfonate of 4-diaminodiphenyl

sulfone. This was given the name Promin and was the first sulfone compound used in human therapy. Three years later Feldman Hinshaw and Moses published a preliminary report on the effect of Promin in experimental tuberculosis in guinea pigs and Rust Block and Hamon reported the inhibitory effect of sulfone drug on avian tuberculosis. Cowdry was the first to use sulfones in the treatment of rat leprosy but the results were not so good as in tuberculosis.

Promin was used for the first time in human leprosy at Carville (USA) in 1941 by Faget et al their first report on this trial being published in November 1943. In spite of the encouraging results only few papers on the subject appeared in the following two years.

During the Fifth International Congress on Leprology held in Havana in 1948 more than 30 papers were presented about the effects of sulfone drugs on leprosy and the opinion was expressed in the report of the Committee on Therapy that the sulfones are the present drugs of election for the treatment of leprosy.



1 Before treatment with DDS
2. After treatment with DDS



At that time only DDS derivatives were in use namely Promin, Diazone (disodium formaldehyde sulfoxylate of diamminodiphenyl sulfone) and Sulphetrone (tetrasodium α γ α γ tetrasulfate of 4,4-bis γ phenylpropylaminodiphenylsulfone). These drugs were rather expensive and had to be administered daily, some of them (e.g. Promin) by intravenous injection. Thus the use of sulfone drugs was almost restricted to institutions and they were not considered suitable for mass treatment on a large scale.

It was then the general belief that the parent sulfone (DDS) was too toxic a drug for clinical use but after 1948 some workers (Floch, Chausinand, Lowe) began using it in a much reduced dose, reaching the maximal weekly dose very slowly and they found that used in this way DDS was as safe and effective as its derivatives.

Finally the demonstration by Lowe and Davey that a sufficient blood level of DDS can be maintained by administration of small bi-weekly doses and the work of Laviron who obtained excellent results by using bi-monthly injections of DDS suspension in ethyl chaulmoograte made possible the widespread use of sulfone drugs. A new epoch in the fight against leprosy had begun.

DDS is an excellent antileprosy drug and highly suitable for mass campaigns in under-developed countries because besides being cheap and very effective it has a low toxicity and is well tolerated when properly administered. Moreover it is very suitable for ambulatory treatment as it may be administered in weekly or bi-monthly doses and it does not give rise to drug resistance.

This does not mean that DDS is the ideal drug against leprosy; it has certain disadvantages as well: the treatment time is too long, it is not effective in 100% of cases and it provokes intolerance (leprosy reaction) in a few cases. More active, better tolerated and less toxic drugs are still a desideratum. Leprosy workers all over the world are trying to find them.

At present trials with new drugs such as derivatives of thioamides (DPT) and of ethylmercaptan (Etsul) are being carried out particularly by Davey in Nigeria with promising results. However experience on an even wider scale is necessary to assess the true value of these new compounds in leprosy therapy.

The expenditure of international agencies on leprosy control since 1953 is shown in the following table

Year	WHO (regular budget) \$	WHO (Technical Assistance) \$	UNICEF \$
1953	9 900	—	93 000
1954	8 700	—	8 000
1955	7 800	5 400	317 300
1956	13 200	1 300	835 500
1957	63 700	9 800	161 000
1958	1 63 300	24 900	4 9 000

The cheapest leprosy campaigns are those in Africa where low cost is related to the high prevalence and patterns of the disease and the development of ambulatory treatment. The estimated cost of treatment in projects in Africa assisted by WHO and UNICEF varies from \$2 to \$8 per patient per year.

REHABILITATION

It is necessary to re-emphasize that the most important measure in the prevention of deformities is the detection and treatment of early cases of leprosy. The earlier the treatment is begun the more chances there are of completely preventing the appearance of deformities.

When the first symptoms of disability appear it is possible to prevent the development of incurable deformities. A most important measure is the education of patients with anaesthetic hands and feet. They should be taught about the hazards to which the loss of the perception of pain now exposes them. It is necessary to impress upon the personnel of the leprosy campaign the importance of spreading this knowledge and convincing the patients that most leprosy deformities are preventable or correctable. The patients should learn to

- (1) use special handles and holders for hot articles
- (2) inspect their own hands and feet daily for thorns and blisters
- (3) dress and splint every wound and keep it splinted until it heals
- (4) wear well fitting shoes or sandals and avoid shoes made with nails

In addition the patient may need advice about types of employment that will not harm his hands or overtax his feet.

The treatment of reducible claw hands can be carried out as ambulatory treatment by auxiliary personnel instructed in this task. This kind of treatment should be provided in all institutions and the personnel in charge of the leprosy campaign should learn about the possibilities for physical rehabilitation of patients by very simple measures.

Many deformities such as irreducible claw hand and certain cases of foot drop can be treated by physiotherapy. The physiotherapy equipment needed for the treatment of patients is not very expensive and all institutions should possess it.

Trophic ulcers the second most frequent complication found in leprosy can be treated in institutions by rest and antibiotics. To ensure complete rest for the foot in cases of trophic ulcer of the feet plaster of Paris is the recommended method. When the ulcer is cured the patient's foot should be protected by a walking iron or rocker to prevent relapse.

Many deformities which are not preventable or correctable by physiotherapy can be cured by plastic or orthopaedic surgery. It is necessary to encourage orthopaedic plastic and ophthalmic surgeons from general hospitals to work part time in properly equipped leprosy sanatoria in those countries in which leprosy is a problem.

Serological epidemiology *

Ten years after the great pandemic of 1918-19 the swine influenza virus was discovered and on epidemiological grounds it was suggested that this virus might be related to the cause of the pandemic. Twenty five years later serological studies lent support to this hypothesis but it remains unproven. If serum samples had been taken before and after the pandemic and suitably preserved a definitive answer to the question would have been possible and we would undoubtedly know much more than we do about one of the great disasters in the history of the human race.

In 1949 a collection of sera was obtained with some difficulty from a group of Alaskan Eskimos. The object at that time was to measure type 2 poliovirus antibodies. No practical method was then available for testing other types of poliovirus antibodies. These sera were however carefully stored and when subsequently methods of testing for other antibodies became available the sera were examined and the important observation was made that neutralizing antibodies to poliovirus persist for twenty years or more in the absence of reinfection.

These are but two of a multitude of examples of the potential value of carefully preserved collections of sera. By their study much light can be thrown on the past history and future evolution of many communicable diseases both those of known

causation and those of which the cause has yet to be discovered.

This approach which has been called serological epidemiology is not however limited to the study of communicable diseases. The report of the WHO Study Group on Immunological and Haematological Surveys¹ also foresees considerable advances in the study of human health and disease through the examination of blood samples for cholesterol and serum proteins as well as for factors present in anaemias and those of genetic importance e.g. abnormal haemoglobins and blood groups.

The proposed multi purpose approach raises a number of problems which are considered in detail in the report. First amongst these is the development of sampling methods to ensure that the collection is in fact representative of the population. The interpretation of the data obtained will often depend on this. The report contains detailed descriptions of different methods which may be adopted. The problems involved in processing the blood specimens collected and in storing the sera for long periods while preserving antibodies and other substances are also considered. Lyophilization is recommended as perhaps the best aid to prolonged storage even though it may damage certain antibodies. The Study Group recommended studies of the effect of different storage methods on different antibodies.

The importance of establishing international collections of sera under the administrative control of WHO was stressed and it was recommended that selected laboratories should be designated to undertake this work. Collections of sera already exist in a number of laboratories. Information regarding them should be assembled and steps taken to co-ordinate research involving their use so

WHO Study Group on Immunological and Haematological Surveys (1959) *Report of the Study Group* (Geneva: WHO, 1959). 35 p. Price 1/9 50/30 Sw. fr. 1.— Publ. h. d. Iso. i. Fre. h. a. d. Spanish.

Members of the Study Group: Dr J. B. Brook by Unit d. K. G. m. D. J. Casal (USA), Dr D. H. Rist (USA) (R. p. port. r.) Prof. s. K. Raska (Czech. lo. ak. a. (V. Ch. cm.) Dr F. Yates (United Kingdom) (Chairman), Dr E. E. H. Secret. t. Food and Agriculture Organization (Geneva), Dr J. H. P. Jo. x. Dr G. Arroyo. G. l. mal. (Consultant), Dr J. H. P. Jo. x. Dr N. Thériault (Consultant), Dr A. A. P. yne (WHO) (do. t. S. cre. tary), Dr B. Fine (WHO) (Unit Secret. ry).

that the fullest advantage may be taken of them. A series of pilot studies is recommended to determine the feasibility of the technical procedures outlined and to improve on them where necessary.

Recognition that animals both domestic and wild play a role often of major importance in many human infectious diseases led

the Group to propose that similar collections of animal sera be established with the co-operation of FAO which was represented at the meeting.

The full potentialities of this approach cannot yet be defined. Further technical development may result in its application to a wide range of human disease problems.

Automation and its human repercussions

While some look upon automation as the gateway to "the golden age" others view it with apprehension. Certainly whatever its advantages or disadvantages it will have important physiological, psychological and social consequences for human beings.

The mental health problems of automation were examined recently by a WHO Study Group¹ and it is clear that while automation may in some ways help to improve mental health it will also provoke new types of strain which require immediate study. It is moreover probably not automation in the form of automatic co-ordination of machine tools on production lines or in the form of automatic control over manufacturing processes that is liable to bring about the most revolutionary changes in mechanized work but a third type of automation i.e. the rapid and automatic processing of an increasing range of technical and business information by the electronic digital computer. This type of automation goes much further in replacing certain human activities hitherto considered to be irreplaceable since it imitates the functioning of the human brain and can be applied to operations such

as the recording, co-ordination and analysis of administrative information. The consequences of automation will thus very probably appear more clearly and rapidly in certain types of office than in industrial plants.

At the present time the general public is badly informed about automation and tends to regard it as a symbol of rapid innovations in commercial and industrial work involving the introduction of new and complicated machines which a certain type of literature has unfortunately painted as monstrous and all powerful. Emotional reactions to its introduction range from unreasonable hopes of a rapid rise in living standards to fears of upheavals in conditions of employment and of difficulty in adapting to the new machines. These reactions however are of an anticipatory nature and are not based on actual experience. In the meantime workers in automated undertakings are already suffering from physiological and psychological strain. In the first place it should be noted that because of its very nature automated work may have psychological consequences for example if the manual activity of a worker who has been accustomed to assess his work on the basis of his physical effort is reduced he will feel himself less useful and suffer from a sense of inadequacy if contact with the machine or with the object on which he is working is eliminated or reduced he will see his task in a more abstract form and this may lead to anxiety if his responsibility is increased his job may become more of a strain. What kind of strains are imposed

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upon the worker? First there is the nervous strain caused by the need for unremitting attention to signals of varying perceptibility often separated by very long intervals. The less the physical activity of such a worker and the greater the number of indicators to be watched the more the nervous tension to which he will be exposed. It is clear that in these circumstances particular importance will attach to working conditions such as temperature sound proofing lighting and the position of the operator and of the machines. By preventing the operator from communicating with others automated work tends to isolate him both physically and mentally. This feeling of isolation may be heightened by the background noise made by the machines.

Tensions of this kind will of course affect individuals very differently according to their cultural level or personal capacity for adaptation.

In addition to its direct effects upon the workers mental health automation will undoubtedly have indirect social consequences. Families may for example be affected by the increased mobility of labour. There will be problems connected with the movement of workers not only from country to country but also between urban and rural areas in one and the same country. Because of the new working conditions it is probable that workers will feel a need to live in a different type of social environment as far as housing and leisure are concerned. The most serious difficulties indirectly affecting mental health are however liable to arise in connexion with the organization of the work itself. If automation calls for more shift work (as appears very likely) this will certainly be opposed by the workers and their families: this point must be given special consideration at the outset.

On the other hand automation may provide certain satisfactions for example in an entirely automated plant each operator becomes more or less his own master: the gap lessens between the factory worker and the office worker who was formerly considered as enjoying more security; changes of occupation in middle age should be easier.

Generally speaking efforts to mitigate the harmful effects of automation on mental health should be based on information and education. Too much importance cannot be attached to active co-operation on the part of the press radio and television and above all to the provision of objective information avoiding sensational eye-catching headlines which may cause needless anxiety. Education in this field will be all the more effective if it is directed primarily towards those in key positions i.e. managers engineers trade union leaders and the medical profession particularly works doctors—although of course the worker himself must also be informed. Such information should be a continuing process. In some cases it might take the form of a consultation which would not only help to dissipate the worker's fears but would also reassure him that his views were being taken into account. Many other methods of preventing the psychological ill-effects of automation can be cited such as careful selection of personnel provision of rest and recreation rooms organization of visits to particularly isolated workers in the factory enabling families to share the professional interests satisfactions and worries of the operators e.g. by arranging visits to the factory organization of lectures and seminars by trade unions.

The repercussions which automation may have on human beings are so far-reaching that there is every justification for a thorough study of the question. A considerable volume of preliminary information will have to be assembled however and the Study Group therefore recommended that priority be given to a series of orientation and pilot studies making wide use of the facilities offered by medico-social services. A second type of study might utilize the usual epidemiological methods. This research work would cover the psychological and psychiatric effects of the new factors in the working environment and the demands which automation makes upon workers. Subsequent research might investigate among other subjects adaptation to shift work (where this is being introduced or extended) and the effects of alterations in distribution of attention or of sublim

inal" attention on for example extra occupational activities and sleep. One specialized but very important question also calls for elucidation: namely, will the employment

prospects of certain categories of handicapped workers be improved by the considerably reduced physical effort required in automated plants?

Health Legislation

Communicable diseases in schools: a comparative study

Absences from school are primarily due to the communicable diseases common among children of school age. The proximity of large numbers of children in the schools and the fact that they are receptive to these diseases favour their spread. The health authorities are thus faced with two problems: to establish measures to prevent the spread of communicable diseases in schools and, on the other hand, to avoid rigid regulations which would interfere with the normal course of school life.

It would seem that a satisfactory solution to these problems has yet to be found, though measures of some sort are applied in most countries and often embodied in the legislation. They specify in particular that children with communicable diseases must not attend school, contacts of a sick child may also have to stay away, the incubation period of the disease being taken into account.

The regulations embodying these measures show two tendencies: the first being to specify fixed periods of exclusion from school, e.g. that a child suffering from poliomyelitis may not return to school until 28 days after the onset of the disease. The second is to allow the medical practitioner or health authority to exercise discretion in each particular case. When the regulations of the various countries that lay down rigid periods of exclusion from school are compared, the periods specified for the same disease are often found to be substantially different. It is therefore obvious that the establishment of rigid standards is not the ideal solution. Nevertheless a comparison

of the recent study published in the *International Digest of Health Legislation*¹ with the study on the same subject published in 1952 shows that a more flexible tendency is now evident. Rigid periods of exclusion are gradually being replaced by measures which allow both sick children and contacts to return to school sooner. The strict exclusion from school of contacts is being replaced by regular surveillance by the school nurse or school medical officer including *inter alia* bacteriological examinations; this more liberal attitude doubtless presupposes a good school medical organization. A more radical approach is that of Burnet, who stated in 1954 that between the ages of six and twelve children should normally have been infected with each of the common epidemic diseases of childhood and have emerged from them unharmed. Unless this happens in childhood, the individual will reach adult life without immunity and will then be liable to have these diseases in a much more acute form. German measles (rubella) is a case in point. Only a few years ago it was deemed necessary to specify periods of exclusion from school both for patients and for contacts, whereas now the situation is entirely different. As early as 1952 a cantonal regulation in Aargau (Switzerland) stated that the exclusion from school of children suffering from German measles was inadvisable since it was preferable that children should contract this disease in infancy. For certain other diseases moreover such

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upon the worker? First there is the nervous strain caused by the need for unremitting attention to signals of varying perceptibility often separated by very long intervals. The less the physical activity of such a worker and the greater the number of indicators to be watched the more the nervous tension to which he will be exposed. It is clear that in these circumstances particular importance will attach to working conditions such as temperature sound proofing lighting and the position of the operator and of the machines. By preventing the operator from communicating with others automated work tends to isolate him both physically and mentally. This feeling of isolation may be heightened by the background noise made by the machines.

Tensions of this kind will of course affect individuals very differently according to their cultural level or personal capacity for adaptation.

In addition to its direct effects upon the workers' mental health automation will undoubtedly have indirect social consequences. Families may for example be affected by the increased mobility of labour. There will be problems connected with the movement of workers not only from country to country but also between urban and rural areas in one and the same country. Because of the new working conditions it is probable that workers will feel a need to live in a different type of social environment as far as housing and leisure are concerned. The most serious difficulties indirectly affecting mental health are however liable to arise in connexion with the organization of the work itself. If automation calls for more shift work (as appears very likely) this will certainly be opposed by the workers and their families: this point must be given special consideration at the outset.

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The repercussions which automation may have on human beings are so far reaching that there is every justification for a thorough study of the question. A considerable volume of preliminary information will have to be assembled however and the Study Group therefore recommended that priority be given to a series of orientation and pilot studies making wide use of the facilities offered by medico-social services. A second type of study might utilize the usual epidemiological methods. This research work would cover the psychological and psychiatric effects of the new factors in the working environment and the demands which automation makes upon workers. Subsequent research might investigate among other subjects adaptation to shift work (where this is being introduced or extended) and the effects of alterations in distribution of attention or of 'sublim

examination or the adoption of special measures that there is no risk of the disease being spread. On the other hand he may prolong the period of exclusion if he has good reason to believe on the basis of the results of the bacteriological examination or on any other evidence that the child is a carrier in a virulent form of diphtheria, scarlet fever, cerebrospinal fever, poliomyelitis or typhoid or paratyphoid fever.

The principal of the school may re-admit a child who presents a medical certificate to the effect that he is cured or in certain rural areas if he is satisfied that the child is free from infection.

In most countries the closure of schools is allowed only in special circumstances. The general tendency is to limit closure and to leave it to the initiative of the health department.

Notes and News

Regional Committee for Africa

The WHO Regional Committee for Africa held its ninth session at Nairobi, Kenya, from 1 to 26 September 1959. It was attended by representatives of 8 Member States and 3 Associate Member States of the African Region. The Malagasy Republic (Madagascar) was separately represented and there were also present observers from UNICEF and several non-governmental organizations. The Director-General of WHO was represented at the session by Dr P. Dorolle, Deputy Director-General.

The following officers were elected: Dr A. J. Walker (United Kingdom), Chairman; Dr Norman Williams (Federation of Nigeria), Vice-Chairman; Dr S. P. Tchoungui (France) and Dr J. St G. Warmann (Ghana), Rapporteurs.

In his report which covered the period July 1958-June 1959, Dr F. J. C. Cambournac, WHO Regional Director for Africa, stated that the health situation in the Region gave cause for sober satisfaction in some respects but for continued concern in others. The mass campaign against yaws in which 17 million people had already been examined and more than 8 million treated had brought the eradication of the disease within sight, notably in Liberia and Nigeria. The success of the campaign had led the population in certain regions of Nigeria spontaneously to raise voluntary contributions for the development and maintenance of rural health centres which would not only deal with what remained of the yaws problem but would

also watch over the general well-being of the people. The development of rural health centres in other countries of the Region was equally encouraging.

About a million leprosy cases in Africa were under treatment with sulfones and it was expected that nearly all would be reached eventually. In fact it was hoped that the present generation of Africans would be the last to suffer from the disease to any large extent.

Anti-tuberculosis work had been greatly extended. Nearly every country in the Region had asked for the services of the two WHO tuberculosis survey teams. A centre for the analysis and co-ordination of tuberculosis work in Africa would shortly be opened in Nairobi. In addition, several mass chemoprophylaxis projects were already under way or being planned in various territories of the Region. Control campaigns by governments had greatly reduced the incidence of smallpox in some areas and eradicated the disease in others. Several governments had requested WHO assistance for the organization of large-scale anti-smallpox campaigns.

In attempting to apply the WHO world-wide malaria eradication programme the Regional Office had been faced with certain special problems which had obliged it to reconsider and improve its antimalaria measures through survey and research. In some areas including the southern Cameroons, Kenya, the southern part of the Federation of Rhodesia and Nyasaland, Mauritius, Swaziland and the Union of South Africa, transmission had been interrupted by

as mumps or measles the exclusion of contacts is pointless because the disease may be spread during the incubation period. It may be concluded that regulations governing communicable diseases in schools should be frequently changed and adapted in accordance with new knowledge.

The study published in the Digest covers the legislation of some fifteen countries. The provisions of the regulations have been compared with recommendations in the literature and in authoritative handbooks for example the *Handbook for Medical Officers of Schools on School Health and Communicable Diseases*². If the recommendations of the latest edition of this work are compared with those of earlier editions it will be seen that the measures now proposed are much less stringent.

Most of the regulations indicate measures to be taken on the occurrence of a number of diseases: those most frequently mentioned being whooping cough, diphtheria, bacillary dysentery, cerebrospinal fever, mumps, poliomyelitis, measles, German measles, scarlet fever, typhoid fever, chickenpox and smallpox.

The study in the Digest is mainly concerned with comparing the measures relating to these diseases and the Appendix contains tables showing the statutory requirements for each of them. To illustrate the differences in the regulations it is enough to cite the measures laid down for whooping cough: for this disease the period of exclusion from school ranges from 21 to 42 days from the onset of the typical paroxysms, from 15 to 21 days after the subsidence of paroxysms, or from 21 to 30 days from the first appearance of symptoms. In certain countries it is specified that children may return to school on subsidence of the paroxysms provided that there has been a certain period of exclusion. In two countries this must not be less than 28 days and in another not less than 21 days and not more than 42 days. The regulations of one country specify that the period of exclusion fixed at 28 days from the onset of the disease may be short-

ened in mild cases if a bacteriological examination shows the patient to be free from infection.

Although certain experts are opposed to the exclusion of contacts, most regulations require a period of exclusion ranging from 7 to 21 days, even 30 days in one case. However, as a general rule, exclusion is only imposed if the child is under a certain age or has not been immunized by a previous attack of the disease or as in Tunisia by immunization. In some countries the regulations state that contacts who have already had the disease are not to be excluded, whereas non-immunized contacts are to be excluded for 14 days. Another text prescribes a period of exclusion of 21 days dating from the isolation of the patient for children from 3 to 6 years of age who have not previously had the disease but allows other children to attend school. In three countries the regulations do not require any exclusion and one recommends it only if contacts have a cough.

In most regulations the term "contact" embraces the brothers and sisters of the patient but often it covers other children who have been in contact with the patient during the incubation period or the course of the disease. Sometimes, as for example in Aargau (Switzerland), no definition of contact is given and it is left to the medical practitioner in attendance to decide which persons are to be subjected to quarantine at the same time, seeing that the fewest possible limitations are imposed on the movement of the persons concerned. In New Jersey (United States) the designation of contacts is at the discretion of the health officer.

For re-admission to school of a child who has been sick or of a contact, the usual requirement is a medical certificate to the effect that there is no longer any risk of infection. Sometimes the decision is taken by the health department or the school medical officer. In the Union of South Africa, for example, the stringent nature of the exclusion measures is lightened by the fact that the medical officer of health may shorten the period of exclusion if he is of the opinion as a result of the bacteriological

² Medical Officer of Schools Association (1954) Handbook for Medical Officers of Schools on School Health and Communicable Diseases, 1st ed. London.

France the Netherlands and the United Kingdom, representing certain territories in the Region. The Government of Canada designated an observer. Also represented were the United Nations UNICEF FAO the Organization of American States and 17 non-governmental organizations in official relations with WHO. The meeting was attended by Mr M. P. Siegel Assistant Director General of WHO.

Dr Abraham Horwitz Director of the Pan American Sanitary Bureau and WHO Regional Director for the Americas, presented his annual report for the year 1958. In the discussions that followed several delegates spoke of recent health advances in their countries and the importance of placing greater emphasis on environmental sanitation was stressed. The Council examined this problem in detail and recognized that the resolution on the subject adopted by the Twelfth World Assembly was particularly applicable to the Region of the Americas. It was therefore decided to recommend to Member Governments that they give priority in their national health programmes to the provision of water supplies. The Director of PASB was asked to co-operate with Member Governments in this field and to establish a special account for the purpose of securing the financial participation of public or private organizations national or international.

The Council expressed its satisfaction at the fact that in some countries of the Americas smallpox had already disappeared while other countries of the Region were conducting intensive campaigns against this disease. It was recommended that governments give special attention to the continuation of programmes to maintain high levels of immunity that they undertake nation-wide smallpox vaccination programmes where these had not yet been initiated and that they study ways and means of producing and storing vaccines and furnish PASB with the information necessary for keeping up-to-date records of supplies of vaccine available for use in any emergency.

After hearing reports by the Bureau and by the country representatives on the status of malaria eradication in the Americas the Council considered that the programme of malaria eradication was already well advanced and that it was necessary to employ the most careful epidemiological techniques to ensure that malaria

had been completely eradicated in a given territory. It requested that the Director study the possibility of establishing in the Bureau a register of areas from which malaria had been eradicated and lay down conditions to be fulfilled in order that a given area might be included in the register.

The Council also recommended that Member Countries of PAHO encourage the creation of co-ordinating committees of nation-wide scope for the study of mycoses as well as undertaking epidemiological surveys to ascertain the extent to which mycoses present a health problem in the Americas.

The Council studied a report on the status of *Aedes aegypti* eradication in the Americas and noted that Guatemala and Honduras were now free from this mosquito. It called upon the countries and territories that were still infested to intensify their eradication activities and recommended that those countries in which the vector had already been eradicated maintain strict vigilance in order to prevent reinfestation.

Problems arising from the advertising of medical products were discussed by the Council which asked the Director to study the present status of control of advertising aimed at the general public and recommended to Member Governments that they adopt measures to prohibit false or misleading advertising of such products.

The Council expressed its agreement with the concept of an International Health and Medical Research Year and recommended that Member Governments submit their comments and specific suggestions to the Director General of WHO. It also recommended that they should start preparing plans to ensure full and effective national and local participation should the proposed activity be approved by the World Health Assembly.

The Council approved the programme and budget of the Pan American Health Organization for 1960 authorizing appropriations to a total of \$4100 000. As WHO Regional Committee for the Americas the Council resolved to transmit to the Director General of WHO the proposed programme and budget for WHO activities in the Region for 1961 so that he may take it into consideration when preparing the WHO budget for that year. With regard to the pro-

residual spraying and the surveillance stage had been reached. A co-ordinated inter-country eradication campaign which had started in south-east Africa promised well. In other parts of Africa however the search was still going on for the right combination of methods which would achieve eradication in the face of complications arising from local epidemiological conditions.

Much also remained to be done in the fields of maternal and child health, environmental sanitation, nutrition, the provision of nursing services and mental health. The improvement of public health services in Africa was rendered at once more difficult and more urgent by the tremendous economic developments taking place in most parts of the continent.

The Committee endorsed the proposed programme and budget for 1961 which called for an expenditure of \$1 573 000 under the regular budget of WHO, \$734 000 from United Nations Technical Assistance funds and an anticipated \$3 261 000 in contributions from UNICEF.

On the subject of the proposed International Health and Medical Research Year which is to be reconsidered by the Thirteenth World Health Assembly in 1960, the Committee was of the opinion that the number and importance of health projects in Africa and elsewhere required the use of all available resources if they were to be brought to a successful conclusion and that the efforts and expenditure involved in the proposed activity were unlikely to be commensurate with the benefits derived from it. It therefore recommended that the holding of an International Health and Medical Research Year be postponed.

The Committee urged Member and Associate Member States to establish national sanitation boards for the planning of water supply programmes and to adopt the WHO standards for drinking water as criteria of quality. It was recommended that a regional meeting or conference on water supplies should be held as soon as possible.

The Committee also recommended that every possible attempt be made to promote more frequent exchanges of information on anti-malaria campaigns between countries with common problems in this field and urged that governments should be given the maximum possible assistance in the form of advice on

technical and administrative matters for the implementation of these campaigns.

This year's technical discussions were on

Medical aspects of urbanization in countries south of the Sahara. Twelve papers on various aspects of the subject were discussed. There was general agreement that governments could not afford to turn a blind eye to the rapid urbanization taking place in the Region. In towns all over Africa the number of inhabitants was exceeding the provision of essential services; this resulted in water shortages, the overloading of sewerage systems, the overcrowding of schools and a number of similar problems. It was recognized that the solution of these problems did not however fall entirely within the province of the public health administrator since it depended to a large extent on the encouragement of balanced rural and urban development through the improvement of social and economic conditions in the rural areas. Among the measures suggested for improving health conditions in the overcrowded urban areas were the creation of green zones and the opening of nurseries for babies and small children whose mothers were out at work all day. These children were often left in the care of *Ayahs*, scarcely older than themselves and completely ignorant of clean habits. By accustoming the children to good standards of hygiene such nurseries would be doing an immense service to the African communities and their citizens of the future.

It was decided to hold the Committee's 1960 session in Accra, Ghana, at a date to be decided later and to hold the 1961 session at the Regional Headquarters in Brazzaville, Republic of the Congo.

Regional Committee for the Americas

The eleventh meeting of the Directing Council of the Pan American Health Organization—which was at the same time the eleventh session of the WHO Regional Committee for the Americas—was held in Washington, D.C. from 21 to 30 September 1959. The meeting was attended by representatives of all PAHO Member States with the exception of Bolivia, Costa Rica and Paraguay as well as by representatives of

developments in this field the WHO Regional Office for Africa held a Symposium on Pesticides at Brazzaville Republic of the Congo from 9 to 14 November 1959. As the subjects discussed were of vital concern to all public health staff working on the control of disease vectors the widest possible representation of the countries and territories of the Region was sought.

The discussions, which were led by four world specialists in vector control came under the following main headings: chemistry specifications and application including problems of sorption and storage in the field; determination and interpretation of resistance levels; toxicity of pesticides to man including the toxicity of insecticides at present in use or likely to be introduced; and methods for the protection of those coming into contact with them; vector control and insecticide resistance.

Vaccination with live poliovirus

At the beginning of 1958 the Health Centre of Andes—a mountainous rural area in South Antioquia Colombia—became alarmed at the number of cases of paralytic poliomyelitis occurring within its province. A request for assistance was sent to the Pan American Sanitary Bureau (PASB) which acts as the WHO Regional Office for the Americas. PASB after an assessment of the situation prepared a plan for oral vaccination with live attenuated poliovirus. Children between 2 months and 6 years of age were vaccinated since serological tests had shown them to be particularly susceptible to infection and since all the cases of paralysis had occurred in this age group. The programme was described in a recent issue of the *Boletín de la Oficina Sanitaria Panamericana*.

In all 7378 children were vaccinated their antibody response being assessed before and after vaccination. Nearly 1000 of the children did not appear to have had any previous contact with poliomyelitis. Before the programme began there had been 15 proven cases of paralytic poliomyelitis in the area; after it began there were 4 more but only in places where vaccination had not yet

been carried out. No cases occurred among the children vaccinated or among their contacts and there were no adverse reactions. There were a few cases of gastro-intestinal disorders; these were no more than were to be expected in a population heavily infested with intestinal worms and other parasites and in the very few cases where the symptoms were severe enough to justify further investigation the stools as a rule revealed only parasites or pathogenic bacteria. A few children died during the vaccination programme but their numbers were less than would be expected from the mortality rate and the causes of death were in all cases shown to be other than poliomyelitis.

The experience gained in Colombia was made use of in Nicaragua where an epidemic occurring in 1958 caused 54 cases of paralytic poliomyelitis and 18 deaths all due to type 2 poliovirus. A vaccination programme initiated there with PASB help was described at the International Conference on Live Poliovirus Vaccines organized under the auspices of WHO and the Sister Elizabeth Kenny Foundation in Washington in June 1959 and reported in the same issue of the *Boletín de la Oficina Sanitaria Panamericana* as the campaign in Colombia.

After a laboratory investigation to identify the epidemic a house-to-house campaign was begun in the city and department of Managua and 47 199 children under 10 years of age were vaccinated orally with live attenuated type 2 virus within 12 days. At intervals of three weeks type 3 and type 1 vaccines were then administered. After the vaccination programme was completed a maintenance programme was begun tri-annual vaccine being administered to all the newborn. From September 1958 till June 1959 59 855 children were vaccinated with type 2 virus 54 732 with type 3 and 49 585 with all three types. These figures represent 98, 91 and 87% respectively of the population of Managua under 10 years of age. The vaccine had no ill effects.

In the 10 months subsequent to the completion of this programme no cases of paralytic poliomyelitis were notified in Managua, where for the last 8 or more years there has not been so long a period free from cases.

visional draft of the proposed programme and budget of PAHO for 1961 several delegations pointed out the difficulties their countries were having in meeting their quota assessments and they therefore requested that no further increase be made in the programme in that year

The Council expressed concern at the serious financial situation of the Pan American Health Organization as a result of the arrears in quota payments and the fact that the Working Capital Fund (WCF) was far below the authorized 60% level. It was agreed that a portion of the budget be assigned to the WCF to bring it gradually up to and then to maintain it at that level. Further ways of remedying the situation were suggested including the adoption by governments of administrative and legislative measures that would make it possible to adjust the dates of quota payments to the fiscal year of PAHO and steps to increase the income of the Organization through the sale of publications and the provision of other services.

The Council invited Member Governments to take the United Nations Special Fund into account as a potential source of international assistance particularly for the development of water supply programmes. It was also recommended that Member Governments include a larger proportion of health activities in their annual requests to the Technical Assistance Board.

The representative of the United States announced to the Council that his Government had decided to contribute \$200 000 to PAHO in 1960 for the water supply programme as well as a further \$2 000 000 to the PAHO Special Malaria Fund. The Council expressed its appreciation for these important voluntary contributions.

Colombia and El Salvador were elected to the Executive Committee of PASB on the termination of the periods of office of Guatemala and Peru.

An entire working day was devoted to technical discussions on Technical financial and administrative aspects of water supply in the urban environment in the Americas. The topic selected for the technical discussions at the next session was Technical administrative legal and financial aspects of garbage and refuse disposal.

The Council held a special meeting at which a scroll recording his designation as Director Emeritus of the Pan American Sanitary Bureau and a gold medal were presented to Dr Fred L. Soper former Director of the Bureau.

The invitation of the Government of Cuba to hold the twelfth meeting of the Directing Council (twelfth session of the WHO Regional Committee) in Havana was accepted.

Indexing and abstracting periodicals

A recent supplement to the *WHO Library News* (1959 Vol 12 Supp 2)¹ contains the second edition of an annotated list of current indexing and abstracting periodicals in the medical and biological sciences. The first edition of this list which was issued in 1953 was limited to current indexing and abstracting periodicals available in the WHO Library. In the new edition this limitation has been removed and an attempt made to compile an annotated list that includes all the more important indexing and abstracting periodicals in medicine and the allied sciences published currently throughout the world.

The information given on 310 publications includes the name and address of the publisher, the 1959 subscription price, the frequency of publication, the number of periodicals regularly scrutinized, the number of abstracts or title entries published, etc. and is supplemented by an index to the principal subjects, to the countries whose literature is abstracted and to the names of publishing or sponsoring institutions or societies.

In bringing the information contained in the first edition up to date and in extending the scope of the list every effort has been made to provide information based on a first hand examination of the original publication.

Symposium on Pesticides

In view of the ever increasing importance of pesticides in vector control and the rapid

The Committee's work will be reviewed in the Chronicle when its report is published

Post basic nursing education

A WHO Conference on Post Basic Nursing Education Programmes for Foreign Students was held in Geneva from 5 to 14 October 1959 to consider how post basic courses for nurses studying outside their own countries could best be adapted to meet their special needs more closely and to prepare them for more effective leadership.

The participants in the Conference came from five of the six WHO regions, and included nurses who had studied abroad, nursing administrators and faculty members of institutions receiving foreign nursing students. There were also representatives of organizations sponsoring fellowship programmes or concerned with placing students. A working paper was prepared for the Conference by the WHO Secretariat on the basis of information provided by 135 nurses from 37 countries who have received post basic training abroad at a total of 38 institutions in 11 countries and by the faculties of 26 schools in 12 countries.

Inter Regional Trachoma Conference

In all the countries of North Africa and the Eastern Mediterranean Region trachoma has the same epidemiological features, and is often intimately associated with acute conjunctivitis. It therefore seems that the disease could be dealt with by similar prophylactic and therapeutic methods in these countries and that the experience already gained by some of them in this respect could be of great benefit to the others.

A Trachoma Conference organized jointly by the WHO Regional Offices for Europe and the Eastern Mediterranean was held in Tunis from 15 to 4 October 1959. It was attended by ophthalmologists from 14 North African and Eastern Mediterranean countries who exchanged information on trachoma and allied eye diseases, and planned studies on aspects of the subject as yet incompletely understood. The principal

method of control discussed was treatment by antibiotic ointments which had already been used successfully on a large scale in internationally assisted campaigns in Algeria, Morocco, Tunis, and the United Arab Republic (Province of Egypt) and would therefore seem indicated for use elsewhere in the Mediterranean area.

The development of local health services

The development of health services is in general closely linked to social and economic changes and their quality depends on the availability of a team of devoted and well trained public health workers who keep abreast of new knowledge and techniques in their respective fields. Self examination and self-criticism are essential to the progress of such services.

On the recommendation of a WHO Study Group on Local Health Service which met in 1954 pilot studies on local health services have been carried out in selected areas by the Governments of India, the Netherlands, Puerto Rico, Sweden, the Union of South Africa and the United Kingdom.

The results of these pilot studies as well as needs for further development were discussed by a WHO Expert Committee on Public Health Administration which met in Geneva from 12 to 17 October 1959. The participants included public health administrators from the six countries where the pilot studies were carried out.

Training of sanitation personnel

In many Asian countries the sickness rate could probably be halved by providing safe water supplies and proper facilities for the disposal of human wastes. One of the greatest obstacles to improved environmental sanitation in the Western Pacific Region is the serious shortage of sanitation personnel and of facilities for their training. A seminar on the education and training of sanitation personnel was held in Tokyo by the WHO Regional Office for the Western Pacific from 21 October to 5 November 1959 at the invitation of the Japanese Government. It was attended by some 40 health workers from 17 countries and territories.

Medical supervision in radiation work

The medical supervision of persons working with all kinds of ionizing radiations including X ray operators laboratory research workers hospital technicians and the staffs of atomic energy plants was discussed by a WHO Expert Committee on Medical Supervision in Radiation Work which met in Geneva early in October 1959. Its findings will be of particular interest to governments formulating regulations and laws on the protection of these workers as well as to such bodies as the International Labour Organisation and the International Atomic Energy Agency.

The Committee found that the health protection of workers in atomic energy installations has been of an exceptionally high standard. This is because the potential hazards of radiations had been intensively studied ever since the discovery of X rays and radioactivity and were fully appreciated at the time atomic energy developments began. It was considered that the health problems of radiation workers should be viewed in their true perspective i.e. as being similar to those of workers with other chemically toxic or physically injurious agents commonly encountered in industry and modern life.

An account of the Committee's work will be published in the Chronicle when its report appears.

Non proprietary names for pharmaceutical preparations

A Sub Committee on Non Proprietary Names of the WHO Expert Committee on Specifications for Pharmaceutical Preparations met in Geneva from 5 to 7 October 1959 to select proposed international non proprietary names for new pharmaceutical substances introduced or about to be introduced into therapeutics. With the growing number of such substances the selection of suitable non proprietary names requires more and more ingenuity: their adoption and use in different countries help to prevent confusion and errors in distribution and dispensing.

In accordance with the WHO Procedure for the Selection of Recommended International Non Proprietary Names for Pharmaceutical

Preparations¹ 756 proposed international non proprietary names have already been published in eight lists in the Chronicle: this procedure enables governments, firms and other interested agencies to check whether the proposed names conflict with trade and other names in their own countries. The number of objections received following publication of these lists has been steadily decreasing, and a recapitulative list is now in preparation.

As well as selecting more than 100 proposed names which will be published within the next few months, the Sub Committee attributed names to a number of drugs liable to produce addiction which although they may not be introduced into therapeutics need non proprietary names for the purpose of international control. It also re-examined the Organization's General Principles for Guidance in Devising International Non Proprietary Names.²

Addiction producing drugs

Meeting in Geneva from 19 to 24 October 1959, the WHO Expert Committee on Addiction Producing Drugs considered the addiction liability of a number of new analgesic drugs from different groups of therapeutic substances with morphine like effect. On the basis of these recommendations the Director General will decide on the status of international control to be applied in each case. His decisions will be transmitted to the Secretary General of the United Nations who will communicate them to the States parties to the various international conventions on the control of narcotic drugs.

The Committee also considered technical questions relating to the international control of narcotic drugs with special reference to the new draft of a Single Convention on Narcotic Drugs. These included the assessment of the addiction liability of drugs, the interaction of analgesic and addiction producing properties and the relationship between analgesic and antitussive properties. The Committee also reviewed the situation with regard to dangerous drugs not covered expressly by the international conventions on narcotics.

See *W.H.O. Chron.* 11 1959 13 157
See *W.H.O. Chron.* 1 1959 13 150

People and Places

Preventive and social medicine

Dr A. L. Banks, Fellow of Gonville and Caius College, Cambridge, has accepted a one year assignment with WHO as Visiting Professor of Preventive and Social Medicine at Lucknow Medical College, India. He will advise and assist the Principal of the College in developing the department of preventive and social medicine, co-operate with other faculty members to see that adequate attention is given to this subject in all parts of the medical curriculum, train an Indian doctor to succeed him in the post and help to develop a field training area.

Dr Banks served for many years as a Principal Medical Officer at the Ministry of Health, London, and since 1949 has been Professor of Human Ecology at the University of Cambridge. He is a member of the WHO Expert Panel on Public Health Administration.

Chemotherapy of tuberculosis

Dr D. A. Mitchison, Director of the Group for Research on Drug Sensitivity in Tuberculosis, Medical Research Council of Great Britain, recently spent four weeks in India assessing and planning the bacteriological laboratory work at the internationally assisted Tuberculosis Chemotherapy Centre in Madras.

A graduate of Trinity College, Cambridge, and University College Hospital Medical School, London, Dr Mitchison served as bacteriologist at the Madras Centre from December 1956 to February 1959.

Iron deficiency anaemia

Dr C. A. Finch of the United States has undertaken a preliminary survey of centres in Africa and Asia where research on iron deficiency anaemia can be carried out under WHO's programme of international medical research.

Dr Finch is Professor of Clinical Medicine at the University of Washington School of Medicine, Seattle, Wash., USA, and a Fellow of the

International Society of Haematology. He has considerable experience of research work on iron metabolism employing radioactive tracers.

Home nursing

Miss Eli Magnussen, Chief of the Nursing Section of the National Health Service of Denmark, has just visited the health departments of fifteen leading cities in the United States and Canada to discuss and advise on problems of home nursing, including the care of the aged. This visit was arranged by the Pan American Sanitary Bureau (WHO Regional Office for the Americas) in co-operation with the US Public Health Service and the Department of National Health and Welfare of Canada.

Miss Magnussen, who holds degrees from schools of nursing and physiotherapy in Denmark, Finland and Sweden, has served on a number of WHO Expert Committees and from 1950 to 1957 was nursing adviser to the WHO Regional Office for the Eastern Mediterranean.

Safety of food additives

WHO is making a study of the pharmacological and toxicological effects of certain substances widely used as food additives, and for this purpose has collected all available literature on antimicrobial preservatives and antioxidants. In addition, scientists from all over the world have been asked by the Organization for their opinions on the possible harmfulness of these substances.

Professor R. Truhaut, Professor of Toxicology at the University of Paris, and Dr H. van Genderen, Chief of the Pharmacological and Toxicological Department in the National Institute of Public Health, Utrecht, are helping WHO to analyse the data collected and will advise it on steps to be taken for the further study of the problem.

Health laboratory resources in Syria

Dr Gunnar Lofstrom, Professor of Bacteriology at the Institute of Hygiene and Bacteriology

The seminar reviewed the present status of education and training of sanitation personnel in the various countries of the Region together with present and future requirements in this field. Promising techniques and trends in environmental sanitation were discussed and principles established for improved sanitation training with particular reference to the conditions and resources of the Region.

Teacher preparation for health education

The importance of the teacher's contribution to the health of schoolchildren is now being increasingly recognized by health and educational authorities and has been the subject of special discussions by UNESCO's International Advisory Committee on the School Curriculum and by the recent Conference of the International Union for the Health Education of the Public at Dusseldorf, Germany.

A Joint WHO/UNESCO Expert Committee on Teacher Preparation for Health Education met in Geneva from 2 to 7 November 1959 to discuss how teachers may learn the elements of healthy living and help to achieve better health for their pupils and for the community.

In preparation for the meeting members of the Joint Committee and other experts drafted working papers and reports on such topics as health facilities in teacher training institutions, the educational aspects of such facilities and the formal health instruction of teachers and student teachers.

Other subjects discussed included the nature and extent of teacher responsibility for the health

of schoolchildren, ways in which schools can contribute to child health, opportunities for health education by teachers, methods and planning.

An account of the Joint Committee's work will appear in the *WHO Chronicle* when its report is published.

Vaccination practices in Europe

Because of the speed of modern communications, infectious diseases cross frontiers with ever increasing frequency and ease. For this reason, preventing their spread is both a national and an international responsibility. Against the majority of them, vaccination remains one of the most powerful weapons available.

Present vaccination practices in Europe and the possibility of controlling and eventually eradicating infectious diseases by vaccination were the main topics considered at a Conference on the Control of Infectious Diseases through Vaccination Programmes, convened by the WHO Regional Office for Europe at Rabat, Morocco, from 23 to 31 October 1959. The Conference discussed the control by vaccination—principally in childhood—of such communicable diseases as smallpox, diphtheria, whooping cough, tetanus, poliomyelitis and tuberculosis. It also examined the vaccination of both adults and children against such diseases as influenza, typhoid fever, brucellosis, rabies, encephalitis, hepatitis, etc. The advantages and risks of different procedures were studied. It is hoped to use the findings of the Conference as the basis for a manual on immunization methods and procedures in mass vaccination.

International medical research

Problems of international medical research with special reference to the role of WHO in this field are the subject of a recent book *World Medical Research: Principles and Practices* published by Butterworth and Company, London. The author is Dr Harry Sutherland Gear, a former Assistant Director General of WHO.

The book opens with a brief historical survey of the growth of science and scientific method and goes on to review principles and methods in present-day international medical research. Examples are given of the part played by research in routine WHO programmes and of special research programmes undertaken by the Organization on communicable diseases, insecticide resistance, cancer and nutrition. Research by the United Nations and WHO's sister agencies on matters of public health interest is also reviewed.

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WORLD HEALTH ORGANIZATION

University of Upsala Sweden has just spent two months in the United Arab Republic (Province of Syria) to advise on ways of strengthening the WHO assisted Central Public Health Laboratory in Damascus and extending its services to the rest of the Province Dr Lofstrom was Chief Medical Officer Health Laboratory Methods WHO Headquarters from 1955 to 1957

Sanitary engineer for Tonga

Mr Benedicto Adan sanitary engineering adviser in the Bureau of Health Services Philip

pine Department of Health has been appointed sanitary engineer in a WHO assisted project in the South Pacific Kingdom of Tonga The aim of the project is to improve sanitation services and the training of sanitation personnel A pilot environmental sanitation programme in a number of villages in Tonga is expected to be undertaken following studies by WHO experts

Mr Adan who is a graduate of the Universities of Kansas and North Carolina has had wide experience of environmental sanitation work in the Philippines

CORRIGENDUM

Vol 13 No 7 8

TWELFTH WORLD HEALTH ASSEMBLY

p 287 left hand column lines 32 34

delete Smallpox eradication campaigns are also being planned in Ethiopia and Iran

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WORLD HEALTH ORGANIZATION

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

VENEREAL DISEASE CONTROL IN CEYLON

Since 1947 WHO has taken an active part in the field of venereal disease control campaign in Ceylon which was started in July 1951 at the request of the Government of that country. In December 1953 the WHO representative decided that it could withdraw and that the appropriate national health authorities would take over the direction of the D E D C Programme of the campaign. In the report of the health authorities based on the WHO short term consultation analysis the situation as in November 1958

The five main objectives of the WHO venereal disease control campaign in Ceylon were

(1) to establish in Colombo a model central venereal disease clinic which would also be used for the training of medical and para medical staff

(2) to develop full time venereal disease services with trained staff in the main centres outside Colombo ("outstations")

(3) to introduce serological testing of expectant mothers as a routine measure and thus to control congenital syphilis

(4) to train local staff to carry out a simple serological test for syphilis at the main outstations

(5) to develop diagnostic and treatment facilities for seafarers in the Port of Colombo

By comparison with countries which have had venereal disease control services for many years there is still of course a great deal to be done. For this reason it is more logical to compare the present situation with that of 1951 when the WHO team began its work in Ceylon. Taking this as the starting point there is no doubt that great progress has been made—and this applies not only to the first two years of the campaign during which it had the support of WHO but also to the last five during which the campaign staff were exclusively national. A good start has been made towards the achievement of all the proposed objectives

Central clinic

Since its foundation in 1952 the central clinic in Colombo has been considerably improved and extended. At the moment it needs more space and equipment so that it may extend its training, laboratory and administrative services.

The quality of the clinical work has improved since the beginning of the campaign and the same may be said of the laboratory activities. The staining of smears is excellent and the early diagnosis of syphilis especially in the sero-negative primary stage by means of microscopic dark field examination is now satisfactory. This represents a considerable advance since 1951. The VDRL test has been used in the clinic since 1956. The quality of the work at the clinic laboratory is particularly important in view of the fact that it is used as a training centre.

The Colombo clinic's activities also include investigation of contacts and health education of patients. Between 1952 and 1955 6523 persons declared by patients to be contacts were examined. Of these 2508 were found to be infected. The results so far obtained justify continuation of this practice possibly with some modifications such as more direct participation by the physician up to the present time investigations of suspected contacts have been carried out by five health inspectors and a public health nurse under the direction of a chief inspector.

Health education is carried out by means of talks, film shows, pamphlets etc. and

dressed to different groups such as expectant mothers students over 16 years of age manual workers etc This is an important activity to which special attention must be given There are some indications which suggest that there has been an increase in prostitution and in homosexual practices in Ceylon these being in turn related to ignorance and low standards of living in a rapidly increasing population

The professional training provided at the Colombo central clinic may be considered as satisfactory Since 1950 34 doctors have specialized in venereal diseases including 15 who were awarded fellowships to enable them to complete their studies abroad It is true that 14 of these doctors have left the campaign for various reasons—and this indicates mistakes in selection which should be remedied so as to avoid wastage of training facilities Once specialists are trained it is essential for them to be kept up to date this is especially difficult in view of the isolation in which many of them work It is therefore extremely important that the outstations be provided with small reference libraries and specialist journals

The statistics published by the Colombo central clinic for the period 1952 1957 show a definite drop in the incidence of early syphilis confirmed by the results of serological examinations of expectant mothers there were 5% positives in 1951 and only 1% in 1957 On the other hand the incidence of gonococcal infections remains almost unchanged and some recent cases suggest that penicillin resistant strains of gonococci may have appeared

Outstations

As already mentioned one of the main purposes of the campaign in Ceylon was to create a number of clinics outside Colombo to provide full time venereal disease services under the direction of competent specialists Although selection and training of staff were begun immediately progress has been slow because of the shortage of physicians Up to the present 8 of the proposed 15 outstations are functioning and to these are attached 11

peripheral clinics The activities vary according to the training and enthusiasm of the outstation medical directors but in general a satisfactory reduction in the number of cases of early syphilis has been noted

Serological examinations

Serodiagnosis is made difficult in Ceylon by the frequency with which blood specimens sent to the Medical Research Institute are contaminated There is also a general shortage of material Contamination of specimens could be avoided to a considerable extent if the persons taking them were better trained and if the equipment in use were improved

Another drawback is the delay in communicating the results of analyses Now that it is proposed to extend the services of the Colombo central clinic there is need for a large laboratory under the direction of a specialist with wide experience in the usual serological tests In view of the increasing importance of false positive biological reactions facilities for the treponemal immobilization test are required

One of the main aims of the campaign is to carry out prenatal serological tests for the purpose of preventing congenital syphilis This work began in Colombo at the outset of the campaign and in the period 1952 1957 180 000 pregnant women were examined Positive cases are treated with PAM and family contacts are investigated The available data show that these prenatal investigations are producing results and that at the present time congenital syphilis is rare

Outside Colombo however the situation is less satisfactory At present routine serological testing of pregnant women is established practice only in restricted areas round the principal outstations Nevertheless in these areas there is less congenital syphilis than there was

Port of Colombo clinic

The clinic in the Port of Colombo began operating in October 1958 It is situated very conveniently and personnel and equipment

are adequate. It is to be hoped that it will achieve its aim but it is as yet too early to evaluate results.

As already indicated, there are reasons to believe that the control of venereal diseases in Ceylon is not entirely a medical question; indeed, it is quite possible that the work of the campaign may increase. A cardinal point in the campaign is that the public must be better

educated. More stringent measures should be taken to prevent the increase of prostitution and male homosexuality practices which are instrumental in spreading venereal diseases. Extreme care must be taken in the choice of personnel to be trained for the campaign so as to avoid waste of money and effort. The future need of the campaign in medical personnel have been estimated as follows: for the Colombo central clinic at least 6 medical officers and for the outstations 15 medical officers working full time.

HEALTH EDUCATION OF THE PUBLIC

Many health services lose in effectiveness if the people for whom they are intended do not understand their purpose or if, because they have not been told, they do not realize to what extent they themselves can help to make them a success. It is for this reason that health education of the public has become an important item in WHO's assistance to Member States. It has been found that the best results are obtained when the health workers in most direct contact with the people participate in the educational work. More emphasis is now laid therefore on direct education of individuals, families or groups for which knowledge of the psychology, educational and cultural level and economic situation of the people concerned is a necessary foundation. WHO has accordingly assigned health educators to its teams working on demonstration projects in maternal and child health, venereal disease control and rural health. The experience gained has proved the usefulness of health education of the public as a means of obtaining the active participation of families and local communities in health campaigns.

WHO has advised on the planning of health education services in a number of countries; it has supplied consultants to participate in preliminary surveys and in the organization of health education services to meet general or specialized problems, and it has set up health education committees to advise and help national and provincial health admin-

istrations. It is accepted in present plans for health education that this is part of the task of all health workers who come into contact with the public and the importance of training professional and auxiliary medical and health workers in the principles, concepts and methods of health education is recognized.

One of the most serious handicaps in health education work is inadequate knowledge of the attitudes of various peoples to, and their beliefs about, health and disease, of the influence of family and group habits, of the effect of many traditions and customs and of patterns of social organization and so on. In an effort to solve this difficulty, WHO has engaged ethnologists and arranged seminars and conferences with the help of anthropologists and social psychologists. The chief aim of these seminars and conferences is the exchange and dissemination of information obtained from various countries by means of different types of study. In December 1953, an Expert Committee on Health Education proposed a series of "guiding principles" for the planning of health education programmes that would give the best results in particular circumstances. In the Committee's report¹ it is pointed out that people will learn if the new ideas are effectively related to those problems that they consider important and do not run counter to their ways of thinking.

and their particular environmental conditions. In order to change ways of thought and living those ways must first of all be understood. The health educator with a sense of mission will accept human communities as they are, respect their personality and putting aside all idea of his own superiority endeavour to work with them on a friendly basis. In 1957 an Expert Committee on Training of Health Personnel in Health Education of the Public met to study ways of deriving the maximum benefit from the health education activities of medical and auxiliary health staff.

How to interest the public

In this connexion health workers will certainly be interested in the opinions of a publicity expert at a discussion group on education in safety measures reported in a recent number of the Bulletin of the Pan American Sanitary Bureau which acts as the WHO Regional Office for the Americas.³ According to the author it is nearly always possible to arouse people's interest since every normal human being is interested in many things and in particular in himself and his family and in what affects its members. The key to the problem is to succeed in relating what it is desired to say to something in which the individual is already interested. One of the axioms of successful communication is that if we wish to convey something effectively to the public we must first of all put ourselves in the public's place. Every public has some interest, some need, some wish which can be touched upon and to which the message it is desired to put across can be related. This need or wish must be found out and used as an emotional bridge between the educator and the public—a bridge over which the message can pass.

There are three elements in communication each one of which determines the significance and value of the other two. The first element is the content of the message that is what it is desired to say, the second is the form that is the manner of express-

ing and transmitting the message, the third is the public that is the people for whom the message is intended. Unless the three elements are carefully and satisfactorily interrelated the message communicated will not have the desired result. The chosen theme will therefore depend on the person or group for whom the message is intended and the form of expression must be suitably and carefully related to the content and the public.

For a realistic approach therefore it is first necessary to decide clearly what group of persons is to be influenced. It is better at the outset to choose a limited group of people on whom considerable pressure can be brought to bear. In this way it is possible to get to know the special characteristics of those concerned and relate the message to their feelings rather than to those of the educator.

Another important point is that methods of mass communication are not likely to be as successful in making people change their habits in the field of health as for example in the commercial field. Such methods (newspapers, magazines, radio and television) become relatively less effective when it is a question of inculcating important ideas in the minds of the public. Although mass communication is undoubtedly an effective way of promoting entertainments and publicizing commercial products, it is not powerful enough to inculcate serious ideas in the minds of individuals to a point where they will change their conduct.

What then is the most effective health education medium: visual material, the written word, the spoken word or personal experience?

The author is of the opinion that "personal experience and face to face communication take first place. The only way of implanting worthwhile ideas is not to be led astray by the latest mechanical media but on the contrary to make use of the traditional basic methods of person to person communication. Health educators can participate in "community activity programmes create such programmes and encourage them in one way or another. In such programmes

they can use the personal communication method among small groups of people who can meet and talk together. Mass communication methods are not suitable for educating the public because the results obtained do not justify the time effort and money expended.

The physician as educator

Another opinion along the same lines but expressed from a different angle is to be found in a working document submitted to the WHO Regional Office for Europe Conference on Health Education held in July 1957 at Wiesbaden (German Federal Republic).⁴ Medical opinion as reflected in WHO expert committees and in professional journals—it points out—now seems to support the general thesis that doctors and nurses should be concerned with health education but that there is a place for the specialized health educator. This view is based on evidence that health education in general has an important effect on the health conditions of population groups. The author cites the following as evidence obtained from health education programmes:

(1) An analysis of the effect of health education on infant mortality among families attending the Poolea Health Centre in South Africa revealed that the infant mortality rate among families which had received health education (expressed as a percentage of live births) was 11.5 whereas it was 24.2 among families which had received no such education.

() Taking the hospital admission rate for children as an index of parental health education Charlotte Naish a general practitioner in England after setting up a patients club for fathers and another for mothers found that the rate of admission to hospital of children under 11 years fell progressively in five years from 2.6% to 0.4%. In these clubs talks and discussions covered general points in paediatrics that were aimed at improving the relationships between doctor, mother and child.

(3) In the hospitals in Cardiff (Great Britain) health visitors have since 1944 been operating an after-care programme of education for diabetics discharged from the hospitals. Teaching covers urine testing, diet and cookery, injections, care of the feet and the problems of diabetes in general. The result has been a dramatic reduction in the number of cases of coma and of gangrene as well as in the need for attendance at hospital out-patient departments.

(4) Significant results were obtained by S. B. Tokar who made an interesting survey of the health education imparted in apprentice courses in Soviet factories: he observed changes in behaviour as a result of the various methods used. Zabolotskaya also obtained clinical improvements in cases of gastric ulcer after instructing patients on the regime they were to follow.

(5) Finally acceptance of mass radio-epidemiology and diphtheria immunization campaigns has been shown to depend on the scope of the health education programme and the care with which it has been prepared.

It seems evident therefore that physicians, nurses and other health workers must receive instruction in health education. The author considers that the aim of this instruction should be to prepare health personnel to "diagnose" and "treat" the state of culture of the individual or group they serve. For this the student must acquire a general education and a sufficiently mature personality. This means that while students must have a good general knowledge of health subjects they must also be able to recognize and accept the limitations of their knowledge; they must be conversant with effective methods of communication and develop a quickness of mind that will enable them to understand and respect people's ideas and behaviour however irrational they may appear. Of special importance is the study of human relationships, especially the doctor/nurse/patient relationship: there must also be understanding of the physical environment, the economic situation and customs and beliefs in relation to health. Instruction on

these aspects provides the necessary background for a proper understanding of the mentality of the patient or of the community

As for communication much of a doctor's or nurse's time is spent talking to people either privately with patients their relatives or community leaders or in group discussions talks or lectures Such meetings should have a two way effect doctor (or nurse) and patient should both emerge the wiser Interviewing relatives is a difficult business (far more complicated than interviewing patients) and every medical student should be taught to do it as carefully as he is taught to carry out a clinical examination

Making the educational diagnosis on which successful health education treatment can be based is also highly skilled work Popular beliefs on disease are often based on knowledge which is out dated by many decades For example surveys recently made in Great Britain showed that 20 30 % of the persons questioned believed that tuberculosis was hereditary but not infectious Here is a case where the doctor or nurse should know the situation and administer the appropriate health education treatment

The considerable amount of information

now in existence on processes of learning and on methods of imparting knowledge and techniques would be of great value to health workers in their work and to students in their studies From this point of view it should be remembered that the teaching methods used in professional education will determine the student's attitude when he comes to use his own methods of health education later on Professional teaching methods should therefore include those which are also commonly used in health education such as case conferences tutorial and free group discussions practical work on a given subject etc The creation of patients' clubs is another teaching method that merits consideration The cultivation of the ability to produce well designed and well written material and to teach and the study of simple teaching aids such as tape recordings and flannelgraphs may greatly encourage the physician and nurse in their function as educators This basic training in health and education should indirectly inculcate in the student in the early stages of his education a feeling for people and an interest in them as complete human beings living in a complex environment for whom disease is only an incident in their lives

Bilharziasis

This little booklet * is a *sine qua non* for all workers interested in bilharzia The work sponsored by the World Health Organization on this subject is not adequately appreciated and this publication should indicate something of their activities which cover a surprising range In addition the published figures maps and pictures will prove very useful to teachers and administrators

The chapter on bilharziasis as a man made disease deserves wide publicity in this country where extending irrigation is likely to increase the parasite load to a dangerous level The need for further research is apparent from the stress which this publication lays upon the difficulties of mollusc control sanitation and education

* This book can be heartily recommended

South African Medical Journal 1959 33 1000

REVISION OF A UNIVERSITY NURSING CURRICULUM

The Higher Institute of Nursing at the Faculty of Medicine
University of Alexandria Province of Egypt Under the
a. t. b. l. h. e. d. in 1955 with help from WHO to p. l. e. u. n. v. e. s. t. y.
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h. a. s. f. the exp. g. n. e. d. d. e. i. t. f. s. t. f. u. y. a. o. k.

There is tremendous interest in the establishment of new schools of nursing in countries now initiating or expanding health programmes for their peoples. It is believed and rightly so that nursing is an indispensable part of the over all health service and that new schools of nursing should have the highest possible educational standards from the outset in order to ensure a supply of well trained nurses in the years ahead. While great care is taken to plan the type of curriculum best suited to each school newness is no guarantee of adequacy and a critical review of the curriculum should be undertaken early in the life of the school to see how well it is fulfilling its purpose.

Such a review was undertaken in 1958-1959 at the Higher Institute of Nursing, University of Alexandria Province of Egypt United Arab Republic where the first class to complete the four year programme leading to the Bachelor of Nursing degree graduated in July 1959. It was thought that by the time this class was in its final year it would be in a position to offer useful suggestions while the faculty would have a clear idea of some of the changes needed. Suggestions made by the 70 students in the three remaining classes of the school to the faculty members working closely with them were also taken into consideration. In assessing the value of the programme the following main questions were asked.

1 What are the specific educational aims of the school?

2 What specific features of the curriculum are designed to achieve these aims?

3 Is the curriculum organized so that the students may derive the maximum benefit from it?

4 Is the achievement of the students in each major sector of the curriculum satisfactory?

5 What are the students problems and expressed needs in each of the courses?

6 What are the major strengths and major weaknesses of the curriculum as carried out during the last four years?

Approximately 50% of the courses in the four year curriculum come under the heading of general education (science and arts courses) and 50% under professional education a distribution which is considered to be suitable for a university nursing programme. It was decided after consultation with the professors in charge of the general education courses that these courses were satisfactory for present needs. The courses in anatomy physiology chemistry physics bacteriology parasitology and the social sciences therefore remain unchanged. Some problems of planning and implementation were however recognized in several of the professional nursing courses and analysed in an effort to determine causes and remedies.

One of the first difficulties discussed related to the course in fundamentals of nursing which is given during both terms of the first

year and aims at incultating knowledge and skill in general nursing as a basis for the clinical nursing courses given during the remainder of the programme. Opportunities are provided for the students to practice such procedures as baths, irrigations, packs, positions for patients and the administration of medicines by mouth and by subcutaneous injection. Practical work had been limited however to carrying out these procedures in the nursing arts laboratory at the Institute because the faculty believed that the students should practice under ideal controlled conditions before attempting to apply their knowledge and skill in actual hospital conditions. Evaluation of the course showed that it had failed to prepare students fully for their second year work. They were completely unfamiliar with the hospital environment and they had to spend extra time acquiring fundamental patient care skills which might have been learned during the first year had the opportunity been provided.

In an effort to solve this problem an experimental unit was set up in a ward of the teaching hospital. The equipment and supplies needed by the first year students were moved into the unit and practical courses in patient care are now given there on two mornings each week. The students can practice in the nursing arts laboratory as before but carry out the greater part of their practical work in the hospital setting. How far the clinical nursing experience gained during the first year will help students to progress more satisfactorily in the second year will not be known until the present school year has ended. So far however it appears that it gives them a solid foundation for their second year course in medical surgical nursing. It may be noted here that all the students who entered the Institute at the start of this experiment completed the first year of the programme and the faculty believes that the opportunity to take part in hospital work may have been a major factor in maintaining their interest.

A second problem was the interval between the course in maternity nursing (given in the second year) and the course in midwifery (given in the fourth year). The course in

maternity nursing had been placed as early as possible on the programme to give students an introduction to human development and to the idea of centring comprehensive nursing care and health teaching on the family unit. The advantages of giving the course in the second year were however offset by the resulting lack of continuity between it and the midwifery course. The only solution to the problem seemed to be a completely revised schedule reversing the order of the second and third year nursing courses in the curriculum and this solution was accordingly adopted. With the maternity nursing course now in the second term of the third year and the midwifery course following it in the fourth year there will be exceptional opportunities for correlating all aspects of the maternal and child health sector of the programme.

The need for a course in psychiatric nursing was recognized for some time and an introductory course was designed for the second year of the curriculum. Its scope was limited however because facilities for clinical work in a hospital for the mentally ill were not available and such work is essential for a full understanding of psychiatric nursing. However the Main University Hospital which accommodates almost 1500 patients offers opportunities for the care of patients with varying types of mental illness. In addition the hospital has one unit with 30 patients who have been diagnosed as mentally ill and in need of special observation and care. By correlating the introductory course in psychiatric nursing with the second year course in medical surgical nursing wider experience in this important field is now provided.

The revised curriculum is shown opposite. When a curriculum is very new there is usually some reluctance on the part of the faculty to ask for changes even when changes may be required. A new nursing education programme however demands critical analysis and revision soon after it is started. This is particularly true of university programmes which lack the accepted guidelines existing for the more traditional nursing education programmes. An early review of the curriculum is necessary also when the faculty has

F t term (S pl mb t F bru y)			Sec d t m (F b ry t J)		
Ttl f ou	H F week		Ttl f c	Hou F week	
	theo	cl t		th o y	cl c
FIRST YEAR					
F d m t l l g	5		F m t cl g	5	
Ana my (lect d d monst t)	3		A t my (l t d d mu rat)	3	
Ph logy (ct d d mo t t)	3		Ph og (t d d monst)	3	
Ch m try	2		B t l ng	3	
Phy	2		P t l ng	1	1
Comm t (I)	4		Comm t (I)	4	
Soc gr (I)	3		Psy h logy (I)	3	
			N t	3	
SECOND YEAR					
Med l g l rs g	4	20	k d l g l g		20
M d al g l d ed l ct (y d ct)	2		l d cal g cl d un t d l ct (ty d nct r)	1	
Ph m logy d ph m t s	4		F d m t l f py h t g	2	
Psy h logy (II)	3		Soc gr (II)	3	
J t t (II)	2	2	Comm t (II)		
Comm t c (II)	2				
THIRD YEAR					
P d t g	4	20	M t t d f t g		20
P d t m d l lect	1		M m d l l t t	1	
Arth o og	3		l f t w l m d l l t e		(l ct f rm)
Psy g f l n g	3		F m d	1	
Comm o (III)	2		P n c pl g m t d f t h g	2	
			P pl t g dm		
			P l t l c	3	
FOURTH YEAR					
M d f y	4	20	P b h th g		20
M d f y l ct	2		P bl h l th adm str	3	
For m d		(S t t m) d g l t m)	Comm t c o t l f m m bl	3	
			E o m	3	

At t l f m b d d l l t h l a t g h l f t t h Gve by th m d cal t f d t

been assembled from various parts of a country or from abroad and the members have had no previous experience in working together. The effectiveness of the new curriculum must be evaluated as the first students progress through the programme and this means continuous analysis.

The Higher Institute of Nursing has now

adjusted its curriculum to the known needs of its students and during the next few years it will appraise the needs of the graduates in the various countries to which they will go to work. Only in this way can the faculty meet its full obligation to the governments which provide the facilities for the school and to the students.

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958 *

7 International morbidity statistics

Death is a clear cut event and the number of such events can be counted. Disease on the other hand is infinitely varied including everything from a minor departure from normal health which does not interfere with a person's activities to a chronic condition condemning a person to bed for a prolonged period. The person afflicted with a disease may experience only one period of illness during a selected period of observation or he may have repeated illnesses from the same disease. Moreover during the same period of illness he may suffer from two or more distinct diseases. The basic problem of what is to be counted is thus an exceedingly complex one and morbidity statistics therefore require a broader approach than that required for mortality statistics. Important consideration has been given by WHO to developing the field of morbidity statistics. In 1950 the WHO Expert Committee on Health Statistics suggested that in view of the magnitude and complexity of statistical procedures in morbidity a conference of experts in morbidity statistics be convened with the object of obtaining an orientation, evaluation and selection of the projects requiring international action in this field.¹ WHO was also asked to request national committees on vital and health statistics and other appropriate national and international agencies for reports on their activities in and plans for statistics of

disease and for their views on what could be done by WHO to improve them.

The Conference on Morbidity Statistics² held in November 1951 pointed out that morbidity statistics were required to amplify the information given by mortality statistics and were useful not only to public health and hospital administrators but also to those concerned with social security programmes to industrial undertakings and to workers engaged in medical and social research. Morbidity statistics it felt should not be defined in any narrow way but should cover all statistics relating to departure from health. Such statistics would be of value for the control of communicable diseases for planning the development of therapeutic and preventive services for an assessment of the economic importance of disease and its relationship to social factors for research into the etiology and pathogenesis of diseases as well as into the efficacy of preventive and therapeutic measures and for the national and international study of distribution of diseases.

The Conference felt that it would be useful to classify morbidity statistics in such a way that countries whatever their stage of development could make some use of the list and it drew up the following list which it did not regard as exhaustive but as illustrative of the wide range and uses of morbidity data. Many of the types of statistics listed were by products of organizations set up for other purposes not primarily in order to ascertain morbidity.

* The larger part of this account of WHO work between 1948 and 1958 is based on the statistical reports of WHO and its constituent bodies. The list of reports is given in the Appendix. The list of reports is given in the Appendix.

	popul	cover g	morbidi	Use	Appl ability
Sickness surveys by home visitation of all persons in selected area	X	1-4	b,c,d,e	ABC	
representative sample of selected area	X	1-4	b,c,d,e	(A)BC	
representative sample of whole population	W	1-4	b,c,d,e,h	C	
Mass diagnostic and screening surveys (tuberculosis, etc.)	XY	3	a,d	ABC	
Census enumeration of sick persons	W	3	d,h	BC	
Census enumeration of certain defects	W	3	h	BC	
Records of notifiable communicable diseases	WX	4	a,b,d,e,f	BC	
Registration of certain diseases (cancer, rheumatism, etc.) with or without follow-up survey	WX	4	c,d,f,g,h	C	
Certification of certain conditions for special benefits (including special food allowance)	W	4	b,d	C	
Records of road accidents	WX	4	b	C	
Records of industrial and occupational accidents and diseases	Y	4	b	C	
General hospital inpatient records	Z	2-4	c,d,f,g	ABC	
General hospital or clinic outpatient records	Z	4	c,d	ABC	
General home-visiting and nursing services	Z	4	d	BC	
Records of special clinics, hospitals and agencies (tuberculosis, mental diseases, venereal diseases, dentistry, etc.)	Z	4	b,c,d,f,g	ABC	
Continuous records of doctors' practices	Z	4	d	BC	
Social security schemes, compulsory and voluntary health plans and funds	Y	1-4	c,d,e	BC	
Penal and veterans' records	Y	1-4	c,d,e	BC	
Life insurance and sickness insurance records	Y	3,4	d,g	C	
Records of health welfare centres (maternity and infant and pre-school child)	(Y)Z	3,4	b,c,d,f	BC	
Medical records in educational institutions (routine inspections, sick leave certificates)	Y	1-4	b,d	BC	
Records of physical examinations of sickness absentees in industrial civil service and other occupational groups	Y	4	b,c,e	ABC	
Sickness and recruitment records of the Armed Forces	Y	1-4	a,b,g,h	(A)BC	

Explanation of figures and letters

W	Whole population of country (or representative sample of it)	e	Estimation of economic importance of sickness
X	Population of selected locality (or sample of it)	f	Research into etiology and pathogenesis
Y	Selected types of persons within population (or samples of them)	g	Research on efficacy of preventive and therapeutic measures
Z	Persons applying to selected health services	h	National and international study of distribution of diseases and impairments
1	All sicknesses at a point of time	A	Countries with no complete enumeration of population and labour, or with only slightly developed, public health and vital registration systems
2	All sicknesses during period of time	B	Countries with no all or partial census and with a well-developed public health and vital registration system for parts of the population (e.g. for large towns) but not for all
3	Selected diseases or impairments at a point of time	C	Countries with an overall census and well-developed facilities for obtaining morbidity statistics
4	Selected diseases or impairments during a period of time		
a	Control of communicable disease		
b	Planning for development of preventive services		
c	Ascertainment of relationship to social factors		
d	Planning for provision of adequate treatment services		

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The Conference felt that it would be useful to classify morbidity statistics in such a way that countries whatever their stage of development could make some use of the list and it drew up the following list which it did not regard as exhaustive but as illustrative of the wide range and uses of morbidity data. Many of the types of statistics listed were by products of organizations set up for other purposes not primarily in order to ascertain morbidity.

* The first part of the report of the WHO Expert Committee on Health Statistics, 1951, pp. 214-215, 337-341, 416-417, 446.

	popul on	Coverag morbidity	Use	Applcability
Sickness surveys by home visitation of all persons in selected area	X	1-4	b, c, d, e	ABC
representative sample of selected area	X	1-4	b, c, d, e	(A)BC
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Census enumeration of certain defects	W	3	h	BC
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Registration of certain diseases (cancer, rheumatism etc.) with or without follow-up survey	WX	4	c, d, f, g, h	C
Certification of certain conditions for special benefit (including special food allowances)	W	4	b, d	C
Records of road accidents	WX	4	b	C
Record of industrial and occupational accidents and diseases	Y	4	b	C
General hospital inpatient records	Z	2-4	c, d, f, g	ABC
General hospital or clinic outpatient records	Z	4	c, d	ABC
General home visiting and nursing services	Z	4	d	BC
Records of special clinics, hospitals, and agencies (tuberculosis, mental diseases, venereal diseases, dentistry etc.)	Z	4	b, c, d, f, g	ABC
Continuous records of doctors' practices	Z	2, 4	d	BC
Social security schemes, compulsory and voluntary	Y	1-4	c, d, e	BC
Voluntary health plans and funds	Y	1-4	c, d, e	BC
Possibilities of veterans records	Y	3, 4	d, g	C
Lif insurance and sickness insurance records	Y	3, 4	e, f	BC
Records of health welfare centres (maternity infant and pre-school child)	(X)Z	3, 4	b, c, d, f	BC
Medical records in educational institutions (of time inspections, sickness absenteeism)	Y	1-4	a, b, d	BC
Records of physical examinations and sickness absenteeism in industrial civil service and other occupational groups	Y	4	b, c, e	ABC
Sickness and recruitment records of the Armed Forces	Y	1-4	b, g, h	(A)BC

Exploring the possibilities

W	Whole population of country (or representative sample of it)	e	Estimation of economic importance of sickness
X	Population of selected locality (or sample of it)	f	Research into etiology of pathogen
Y	Selected types of persons in whole population (or sample of them)	g	Research on efficacy of preventive and therapeutic measures
Z	Persons applying to selected health services	h	National and international study of distribution of diseases and morbidity
1	All sicknesses at a point of time	A	Countries with no complete enumeration of population and lacking, or with only slightly developed public health and vital registration systems
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a	Control of communicable diseases		
b	Planning for development of preventive services		
c	Ascertainment of relation of socio-economic factors		
d	Planning for provision of adequate treatment services		

The Morbidity Conference also discussed the various types and sources of morbidity statistics. The sickness or population survey was widely applicable both in the less and in the more developed countries. In the former the possibility of obtaining morbidity data from the existing registration or record services was extremely limited but the organization which was responsible for the planning of the health services could carry out a sample survey which was relatively inexpensive and could be utilized to answer a variety of questions. However experts in sampling theory were required to plan and supervise the surveys and analyse the data collected. The WHO Expert Committee on Health Statistics accordingly recommended in 1951 that national health administrations establish groups of such experts and that national committees on vital and health statistics explore the possibilities of the survey particularly its applicability in the less developed countries and study the statistical methodology involved. It asked certain countries which had experience of surveys to report to WHO on their use so that information could be conveyed to national committees on vital and health statistics or their equivalents elsewhere.

Other sources of morbidity statistics of importance were records of hospital inpatients and outpatients and those kept by general practitioners, health welfare centres, educational institutions, the armed forces and industrial, civil service and other occupational groups (in respect of absence on account of sickness). Many of those records manifestly suffered from defects—those from hospitals for example were of a highly selective character and contained an unknown amount and direction of bias—but clearly their use as a source of statistics on disease could be greatly developed with the collaboration of national committees on vital and health statistics.

Two fundamental problems faced by WHO were those of definitions of terms used in morbidity statistics and measurement of morbidity. There were terms descriptive of ill health of a particular episode of ill health of severity of duration

of an episode or of its location in time as well as special terms used in hospital statistics and terms referring to medical consultation. Furthermore diseases could be classified according to type, severity, duration or the kind of medical care involved or the usual prognosis or the degree or likelihood of (permanent) incapacity or invalidity or according to the probable period of invalidity or the prospects of effective therapy or cure or a rough scale of health ranging from the state of complete health to extreme ill health. On none of these points was there any standardization of definition nor was there any on methods of measuring morbidity and the terms by which they should be described. The measurements appeared to be concerned primarily with the frequency of illness in the population and with the results of treatment carried out on all or a part of it. They therefore depended on information about the illness in a given period of time (which might be expressed in days, weeks or years) or at a single point in time. Discussing the comparability of the statistical units involved in the compilation of morbidity statistics, the WHO Expert Committee on Health Statistics³ agreed that these units would generally be "persons, illnesses or spells (episodes, periods) of illness. In any given period, say a year, a patient might suffer from illness A twice and from illness B three times at different periods. He would then have contributed one unit of statistics to "persons, two to "illness and five to spells of illness. The Committee regarded it as essential that it should be made clear to which of these three concepts of morbidity the statistics actually related. Furthermore whatever the class of unit, the illness would either begin within the period of observation, end within it, be current at any time within it or be current at some particular point within it. Alternatively the statistics might relate to the duration of sickness current or ending during the period.

In its sixth report⁴ the Expert Committee considered that for many purposes morbi-

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dity could best be measured in terms of (1) periods (spells) of illness or alternatively persons with illness *commencing* during a defined period (2) illness *current* or persons ill during a defined period (3) illness *current* or persons ill at a particular point of time within the period or at an average point of time within the period and (4) the duration of these illnesses. The term "incidence" was recommended for use in describing the measurement of frequency of illnesses commencing during a defined period, the term "period prevalence" in connexion with illnesses in existence at any time during a defined period and the term "point prevalence" for illness in existence at any particular point of time.

The WHO Expert Committee on Health Statistics has also reviewed morbidity studies carried out by national committees on vital and health statistics and the progress made in a number of subjects relating to morbidity statistics.³ Realizing that many problems in health statistics could best be dealt with on a regional basis, the Committee recommended that regional and inter-regional conferences of specialists from countries presenting comparable conditions should be held periodically with WHO co-operation and the participation of national committees on vital and health statistics to discuss such problems in the light of local conditions.

Noting the stress laid by the Seventh Revision Conference on the desirability of exploring methods of vital and health statistics registration suited to the needs of countries at various stages of development, the Expert Committee expressed its satisfaction at what was being done in that respect. The African seminar on vital and health statistics held at Brazzaville in November 1956 under the joint auspices of the WHO Regional Office for Africa and the Commission for Technical Co-operation in Africa South of the Sahara (CCTA) had gone into the problem at great length, discussing existing statistical organizations and procedures, methods of obtaining statistics, training of staff and the interpretation of the data collected. The Latin American

Centre for the Classification of Diseases established in Caracas in 1955 under the joint auspices of the Government of Venezuela and the Pan American Sanitary Bureau had published booklets of instructions, pamphlets and special studies and established a training programme for coders. The Expert Committee after listening to reports by the statistical advisers attached to the Regional Offices for the Eastern Mediterranean and the Americas noted their usefulness but observed that in many countries statistical information of varying degrees of accuracy was being mixed with the result that the value of the data as a whole was diminished. It recommended therefore that the data in those countries be sorted into homogeneous groups and that if published each set of data be accompanied by a formal statement of their degree of reliability and a clear indication of the population groups to which they referred.

Hospital statistics

The WHO Expert Committee on Health Statistics has from the outset paid attention to hospital statistics as an obvious if frequently untrustworthy source of information on disease, even in the least developed countries. A Sub-Committee on Hospital Statistics met in Geneva in 1950. It discussed among other topics the limitations placed upon the utilization of hospital experience by the fact that the selective character of hospital admissions generally precluded the drawing of conclusions regarding the prevalence and distribution of disease in the community as a whole. It considered that the International Statistical Classification of Diseases would generally serve the needs of hospitals better than any other classification for the compilation of statistics of illness and recommended its use both for the benefit of hospitals themselves and as a step towards international comparability.

The Sub-Committee felt that certain selected countries and areas with a *definable* population at risk as well as selected hospitals should be encouraged to compile

hospital morbidity statistics as a matter of routine. For such statistics individual reports should be prepared, the part on diagnosis to be completed by the physician himself or under his direction in accordance with the grouping given below:

- I Principal disease, injury or other condition which led to the admission
- II Principal complication(s) of I (stating the most important one first and whether present at admission)
- III Principal accessory acute condition (stating whether present at admission)
- IV Principal accessory chronic condition

The Sub Committee made several other recommendations regarding the form of the report and what it should contain and emphasized that the preparation of reports of that kind did not mean that there should be no numbering of individuals in terms of admissions or discharges or of principal diagnoses. Certain special problems relating to statistics in mental, maternity and tuberculosis hospitals to a diagnostic cross index (using the International Classification) to the preparation of a code for anaesthetics and operations and to multiple admissions were suggested for further study either by national committees on vital and health statistics or by the Expert Committee on Health Statistics.

Noting the Sub Committee's reference to the selective character of hospitalized illness, the Expert Committee afterwards stressed the need for investigating ways and means of bridging the gap between hospital statistics and statistics of the community from which the hospital patients were drawn. This might be done by the family type of survey or by the complete coverage of medical care services.

The Expert Committee in its fifth report⁷ considered that it was still not in a position to make recommendations on the type of form needed to ensure international comparability of hospital statistics of morbidity. It accordingly recommended that WHO study the systems at present in use throughout the

world as a preliminary step to a future and thorough examination of the subject. In the collection of hospital statistics a distinction should be made between residents and non-residents of an area so as to link the data more closely with the population at risk. The Committee also expressed the view that the one day census of hospital patients that was used in Japan was an economic way of getting useful information on the medical and other characteristics of the population receiving medical care.

In its sixth report⁸ the WHO Expert Committee on Health Statistics reviewed a series of terms commonly used in connexion with hospital statistics—for example admission, first admission, re-admission, discharge, in-patient, patient day, duration of stay—and noted that there seemed to be a high measure of agreement on the definitions of these terms. It considered that the general definitions of measurements of morbidity were applicable to hospital in-patient morbidity statistics but with a number of changes in terminology, e.g. admission rate would correspond to incidence rate⁹ and daily bed occupancy to prevalence rate.

Another step towards international standardization of hospital statistics was taken by WHO with the convening in November 1958 of a European Conference on Hospital Statistics and their Application in Health Administration. The Conference considered that the International Classification of Diseases (Detailed List of three digits or the extended list with four digit sub-categories) was suitable for the diagnostic coding of hospital records. For special types of hospitals or for special groups of diseases a local *ad hoc* extension of the classification by means of five or six digit sub-categories might sometimes be necessary. For the presentation of hospital statistics a much shorter list was required and WHO was urged to prepare such a standard list. Mention was made of certain short-cut methods such as hospital censuses, sampling, periodic surveys and *ad hoc* enquiries to collect the necessary data. The need for ensuring medical

secrecy was emphasized. The Conference also considered the value of hospital records for hospital planning, study of disease and in particular research. It concluded that if additional data could be secured by means of special enquiries the material could well be used in studies on human genetics, birth weight in relation to the duration of gestation, maternal age and parity etc.

Notifiable communicable diseases

Notifiable communicable diseases represent only a small part of the total morbidity but owing to their preventable nature they are of considerable importance in public health. The problems involved in securing prompt and reliable information on these diseases were studied by the WHO Conference on Morbidity Statistics in 1951.

The Conference recommended that the fullest co-operation be sought from the medical profession and health institutions to improve completeness of notification that uniform procedures for ensuring correction of diagnosis be adopted and that it be made clear for each disease whether it was intended that notification be based on clinical findings alone or laboratory and other evidence or both. The national committees on vital and health statistics were asked to study special problems and WHO was requested to undertake a critical appraisal of the uses of statistics on epidemic diseases and of their value to the epidemiologist, the quarantine official and the health statistician.

A seminar on reporting of communicable diseases held in Chile in 1955 developed basic procedures for reporting and recommended legal, educational and administrative measures for this purpose. Procedures for the international exchange of data were developed. The recommendations made have been used in the revision of the *Guide for the Reporting of Communicable Diseases in the Americas*.

The problem of notification of disease was considered by the WHO Expert Committee on Health Statistics in its sixth report.¹¹ The Committee emphasized the desirability of distinguishing in tabulations between provisional notifications and "corrected notifications" and asked that indication be given of the estimated degree of error to which these statistics are subject as a result of incompleteness of notification. In respect of certain notifiable diseases such as tuberculosis distinction was to be made if possible between "new cases" and "newly detected pre-existing cases".

Accuracy and completeness of notifiable disease statistics are linked with legal provisions and their implementation. WHO has published a survey of the existing legislation on the notification of communicable diseases.¹

Sickness surveys

The sickness survey is a good statistical tool if properly handled by trained persons. Its advantages have been succinctly expressed in the third report of the Expert Committee on Health Statistics:

- "(a) it provides the possibility of linking morbidity data to a variety of social and economic conditions
- (b) the population covered is automatically defined
- (c) it offers a means of linking the data in existing medical records to that obtained from the general population
- (d) if probability sampling methods are employed the desired information can be obtained with specified precision at the smallest possible expense
- (e) the method is flexible and can be utilized to provide answers to a wide variety of specific questions of practical administrative as well as scientific importance and
- (f) if the objectives of the investigation are not continuous once the specific

¹ P. Amey, *Survey of Communicable Diseases in the Americas* (1955), *Bull. WHO* 1955, 1: 1-10.
² P. Amey, *Survey of Communicable Diseases in the Americas* (1955), *Bull. WHO* 1955, 1: 1-10.
³ P. Amey, *Survey of Communicable Diseases in the Americas* (1955), *Bull. WHO* 1955, 1: 1-10.

¹¹ *WHO Weekly Rep.* 1955, 1: 1-10.
¹² *WHO Weekly Rep.* 1955, 1: 1-10.

objective has been accomplished the survey can be easily stopped and the personnel utilized for investigations of other problems ¹³

The survey raises all the problems common to all medical statistical inquiries such as the standardization of nomenclatures definitions and classifications and one peculiar to itself the problem of sampling. Here are involved the questions of whom to include in the survey how to train the field teams and what methods to use and the answer to these questions in turn depends on the statistical theory of sampling adopted. It is rarely practicable or even desirable to survey a whole community. The First International Conference of National Committees on Vital and Health Statistics in London in 1953 drew attention to the value of modern sampling methods in all statistical practice and recommended the use of such methods for the study of morbidity ¹⁴

Special problems of under developed areas

In various proposals for remedying the lack of vital and medical statistics in the world account has been taken of the special needs of under developed areas. In the United Nations *Principles for a Vital Statistics System* ¹⁵ for example the importance of special arrangements for the counting of the population (census) and the registration of vital events is indicated and methods suitable for various types of country are recommended. Health and medical authorities are concerned in these matters especially as the evaluation of mortality and morbidity is difficult in the absence of such denominators as size of population and general birth and death rates. The same general problems which face the vital statistician also frustrate the medical and health investigator. These include absence of a comprehensive national health administration with local officers lack of communications the existence of

social and economic barriers to the acceptance of such essential matters as census and notification of diseases lack of medical and nursing services illiteracy of the population difficulties both social and economic in the introduction of special techniques such as demonstration areas and mobile teams to collect essential data. Inevitably the lack of essential data from large parts of the world and the recognized difficulties in obtaining early comprehensive information from such areas have presented the various international statistical groups with serious problems.

As early as 1949 the Expert Committee on Health Statistics ¹⁶ recommended that special studies be carried out in under developed areas on methods suitable for measuring the state of health and the prevalence of disease. It called for an early report on these methods so as to make such knowledge available to similar areas.

Similarly the Conference on Morbidity Statistics ¹⁷ held in Geneva in November 1951 noted that the International Statistical Classification is difficult to apply in countries with few qualified physicians and where morbidity statistics are based largely on imperfect diagnoses or symptomatic descriptions. It therefore suggested that the World Health Organization ask such countries to design lists of selected diseases based on the Intermediate Lists of the International Statistical Classification.

The first International Conference of National Committees on Vital and Health Statistics ¹⁸ held in London in October 1953 examined the question of areas with under developed health and statistical services. It agreed that every effort should be made in such areas to maintain full records and to produce summarized figures of the diseases treated in medical institutions even though such summaries sometimes gave a misleading picture. It proposed that in areas where full information could not be readily obtained by the usual administrative means medical surveys should be organized possibly by

World Health Organization Report 1953 53 9
 World Health Organization Report Series 1954 85 14
 United Nations (1953) Principles for a Vital Statistics System
 J. Statist. Soc. B 16 (1953) 191 New York

World Health Organization Report 1950 5 9
 World Health Organization Report Series 1952 53 2
 World Health Organization Report Series 1954 85 11

using mobile teams. It urged that when any health programme was introduced into such areas statistics should be made an integral part of the programme. It also drew attention to the value of sampling methods either in the form of sample registration districts or of special inquiries as an important device for determining the essential facts.

Aware of the importance of providing a simple list, the Conference for the Seventh Revision of the International Classification recommended an amendment to the WHO Nomenclature Regulations.¹⁸ This amendment gives greater flexibility by providing for the use of special lists of diseases easily recognizable by subordinate medical personnel yet following the general structure of the International Classification.

In keeping with the need for continuing study of local difficulties in this field, the seminar on vital and health statistics held in Africa in November 1956 gave consideration to hospital statistics, returns from out-patient dispensaries, records from mobile medical units, data on notifiable diseases, and crude causes of death in certain countries as collected by non-medical personnel.¹⁹

The report of this seminar, together with other material on the subject, was studied by the WHO Expert Committee on Health Statistics and commented on in its fifth report.²²

Morbidity statistics published by WHO

The WHO *Epidemiological and Vital Statistics Report* since the beginning of 1957 has produced morbidity statistics²³ for diphtheria, meningococcal infections, tuberculosis in certain non-European countries, acute poliomyelitis, smallpox in Europe, acute infectious encephalitis, tuberculosis in Europe since 1950, brucella, typhoid, typhus and other rickettsial diseases, typhoid and paratyphoid fevers, dysentery, influenza, venereal diseases in Europe, and whooping cough. The statistics on diphtheria²⁴ to take an example, cover cases of the disease from 1950 to 1955 in 15 African, 21 American, 17 Asian, and 24 European countries and in Australia and New Zealand. Recent data are given on the seasonal distribution of cases, their sex and age distribution, and the number of vaccinations carried out in various countries.

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MENTAL HEALTH IN AFRICA SOUTH OF THE SAHARA

For an appreciation of what present and future mental health problems are likely to be in Africa, it is sufficient to consider for a moment the extraordinarily rapid developments now taking place there in so many domains.

People are increasingly forsaking traditional customs and leaving the rural areas for the town, while cultural and social upheavals are occurring due to the fact that Africans today are receiving an education which is

entirely different from that of their forebears. In a human society that is evolving so rapidly there is a danger that mental health problems will become more and more important. While these problems have some points in common with those affecting societies whose evolution has slowed down, they differ sufficiently to justify a special approach to psychiatric care in Africa. Africans are all the more susceptible to mental disorders in that they are exposed from birth to such

infections as trypanosomiasis malaria and helminthiasis and because malnutrition—aggravated at present by alcoholism—is more or less general in Africa

In the light of this situation how should psychiatric care be organized in Africa? Two facts should be noted at the outset firstly that nearly everything has still to be done in this field which means that the way is clear for psychiatric services that will really meet the situation secondly that there is a considerable shortage of funds practically everywhere so that some inexpensive system will have to be devised at least to start with

Naturally at some time in the future it will be necessary to consider the building of psychiatric hospitals which will be real treatment centres and not mere places of confinement But assuming that the financial means for this will eventually be forthcoming there is one error which must at all costs be avoided the building of psychiatric hospitals before adequate specialized personnel are available Many administrations tend in fact to think that they have already found the solution to a public health problem when they have premises at their disposal Where mental health is concerned if premises are available without adequate specialized staff they are soon likely to be full of all kinds of socially maladjusted persons for whom psychiatry can do little

There is a solution however which can be quickly put into practice and is at the same time an economical one the creation of psychiatric services within the existing general hospitals Under this system any building necessary will be on a limited scale and the other specialized services such as electro-radiology laboratories and surgery will be already there Moreover the psychiatrist will be less isolated and recruitment and training of personnel will be facilitated However if there is no possibility of admitting patients to a specialized psychiatric hospital service other methods of treatment may be envisaged For example an out patient clinic can be attached to a general hospital or to a rural health centre In areas where none of these

facilities exists it should be possible to set up psychiatric field units which in addition to giving the usual somatic treatment would collect data on the prevalence of mental disorders in the area and provide the information necessary for planning a more elaborate mental health service

In any case whatever plan of action is considered one principle of psychiatric assistance is especially important namely that of team work A typical team of six might for example include two psychiatrists two social workers one male or female nurse and one psychologist—and at least some of the members of the team should be local inhabitants Since in Africa it is not possible to count upon having a sufficient number of specialized teams quickly use could be made of teams for general medical and public health work already on the spot giving them intensive training in the principles of modern psychiatry The shortage of specialized psychiatrists might also make it necessary to use the services of general practitioners interested in psychiatry for whom further training facilities could be provided

It is desirable for psychiatrists practising in Africa to have a thorough grounding in tropical medicine but their selection raises many problems Until more African doctors decide to specialize in psychiatry European medical men will have to be responsible for advancing mental health in the continent Recruitment and training of nurses work therapists and social service personnel is easier but care must be exercised here too if the work of the team is to be of value in the field of African public health in general and not only in that of psychiatry

These are the main points that emerge from the recently published final report of the seminar on mental health in Africa south of the Sahara which was held at Brazzaville from 24 November to 4 December 1958 "to define the first measures to be adopted in the field of mental health in Africa

Epidemiological and Statistical Information

Incidence of quarantinable diseases, 1958-1959

The following brief review of the incidence of quarantinable diseases relates to 1958 and the first nine months of 1959 and is based on a document submitted to the WHO Committee on International Quarantine in October 1959. The figures for 1959 are based on provisional notification.

Plague

The downward trend of plague incidence observed in recent years continued in 1958 and 1959. The number of cases officially notified throughout the world (excluding continental China) fell below 300 in 1958 and about 100 cases were officially notified during the first nine months of 1959. With the exception of 3 cases in the United States of America, all cases notified in 1959 occurred in areas where plague was also present in 1958.

The 69 cases reported in Africa in 1958-59 occurred in the north-eastern part of the Belgian Congo, in the Central Province of Kenya and in the Tananarive Province of Madagascar, where the last case was notified in April 1959.

In the Americas there were active foci in the Provinces of Loja and Chimborazo in Ecuador (49 cases in 1958-59) and in the Departments of Iruya, Lambayeque, Cajamarca and Ancash in the north-western part of Peru (78 cases in 1958-59). In Brazil, all 25 cases notified in 1958 occurred in the State of Bahia. A single case was also reported in the Misiones Province of Argentina where no case had been reported since 1957. In the United States, sporadic cases were notified in 1959 in rural areas of California () and New Mexico (1).

In Asia (outside continental China) the highest number of sporadic plague cases

(about 150 in 1958-59) was reported in Burma. A considerable proportion of these cases occurred in urban areas such as Mandalay, Rangoon and Bassein. In India in 1958-59 cases were reported mostly in the southern part of the country in the Kolar and Mysore districts of Mysore State (16 cases) and in the Salem district of Madras State (32 cases) though at the end of September 1959, 10 cases were reported in Himachal Pradesh State, Northern India. In Viet Nam, 15 cases were notified in Tanan and Baria Provinces in 1958 but none in 1959. In Indonesia, Java was apparently free from plague in 1958 but evidence of the disease was reported from the Bojoluti Regency (Central Java) between March and May 1959. In Iran, 11 cases were recorded in the Miandoab district of the Kurdistan in 1958.

The presence of rodent plague was notified in Africa in the areas of the Belgian Congo and Kenya where human cases were also reported. In the United States, plague infection was found among rodents in Klamath County, Oregon in 1958 and in Tuolumne and Mariposa Counties, Calif. in 1959. During 1959, infection among rodents was also reported in the Bojoluti Regency, Indonesia and Hamadan City, Iran.

Cholera

Cholera incidence in 1958 was higher than during the four preceding years and epidemics occurred in Thailand, Nepal and West Pakistan as well as in India and East Pakistan. According to revised figures, some 98,000 cases were notified in Asia during the year as compared with 64,000 in 1957 and 247,000 in 1953.

In 1958, about 16% of all cases notified during the year occurred in East Pakistan.

i.e. 16 423 cases of which 10 541 were fatal. The apparent case fatality rate in East Pakistan (64%) is higher than in India and may indicate that the notification of cases is incomplete.

According to revised figures 66 536 cases with 28 527 deaths (corresponding to 43% of the cases) were recorded in India in 1958. About 30% of all these cases were notified in West Bengal and Bihar while over 60% were recorded in the central and southern States of Orissa, Madhya Pradesh, Bombay, Mysore, Andhra Pradesh and Madras where 55% of all cases in India occurred in 1957. At the time of the seasonal peak in August 1958 the disease also spread to the north western part of the country as far as Delhi and some districts of Punjab and Rajasthan.

In West Pakistan after ten years' freedom from cholera there was an outbreak in November 1958 and cases were recorded in the districts of Lahore, Sukkur and Dadu as well as in the Karachi area (318 cases in all).

In Nepal an epidemic occurred in July 1958 in the Kathmandu area and accounted according to revised data for 2706 cases and 384 deaths.

In May 1958 cholera broke out in Thailand from which the disease had been absent since 1949. About two thirds of all reported cases (11 597) were recorded in Bangkok and the neighbouring Thonburi Province.

Provisional totals of cases notified during the first nine months of 1959 indicate an unusually low incidence in India and East Pakistan only 8636 cases in India of which 2184 occurred in West Bengal and 5306 cases in East Pakistan.

In Thailand 6970 cases (with 492 deaths) were notified during the first nine months of 1959. The seasonal peak was reached during the week ending 14 February with 1090 cases of which 949 occurred in the Bangkok and Thonburi areas.

Yellow fever

In 1958 56 cases of jungle yellow fever were officially notified in the Americas of which 22 cases (in 17 local areas) occurred in Colombia, 16 (in 9 areas of Mato Grosso

Goiás and Minas Gerais) in Brazil, 10 in Venezuela, 6 in Peru and 2 in Bolivia. During the first nine months of 1959 only 4 cases were reported in Colombia, 3 in Brazil, 1 in Peru and 2 in Trinidad (Narica Mayaro County) where the disease had not been observed since 1954.

Except for the 2 cases in Trinidad and 1 case in Peru, all cases notified in the Americas in 1958-59 occurred in areas where the disease had been reported occasionally during the previous ten years.

No evidence of the presence of yellow fever in vertebrates other than man was officially notified in the Americas during 1958 and 1959.

All 84 cases reported in Africa in 1958 occurred in the Belgian Congo north of the Equator in the Provinces of Equateur and Orientale. During the first nine months of 1959 only 3 cases were notified in Africa of which 2 occurred in the Accra division in Ghana and 1 in the Bida division, Northern Region of Nigeria.

Smallpox

Mainly owing to the unfavourable situation in India and East Pakistan, smallpox incidence was higher in 1958 than during any of the six preceding years and accounted throughout the world (outside continental China) for about 247 000 cases as compared with less than 150 000 annually from 1957 to 1957 and 489 000 in 1951. India and Pakistan accounted for 88% of all cases officially reported in 1958. Although the figures for 1959 are provisional and often very incomplete, they indicate with only one exception (Thailand) a very low incidence during that year.

Africa

The total of officially notified cases fell from about 33 000 in 1957 to 20 000 in 1958 while only about 9000 were provisionally

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recorded during the first nine months of 1959. The improvement in the situation is noteworthy in the western part of the continent. In Nigeria the territories formerly comprising French West Africa and Sierra Leone. Smallpox incidence was still very high in Liberia where according to incomplete and irregular reports over 5000 cases occurred in 1958.

The Americas

Brazil, Colombia and Ecuador are at present the main foci of smallpox in the Americas where 3595 cases in all were officially registered for 1958 and 2278 were recorded in the first nine months of 1959. In several South American countries the downward trend of smallpox incidence continued in 1958-59 when the number of officially notified cases decreased in Bolivia and in Colombia and only a few cases were recorded in Argentina, Paraguay and Panama. It is not possible to judge the situation in Brazil owing to the absence of current data. However the occurrence in 1959 of an epidemic with some 600 cases in the urban area of Belo Horizonte (capital of the State of Minas Gerais) would indicate that smallpox is still an important problem in that country.

Asia

In 1958 the number of cases reached about 168 000 in India as compared with 79 000 in 1957; it remained however lower than in 1951 (about 251 000 cases). Some 46 000 deaths were recorded corresponding to about 13 smallpox deaths per 100 000 population. The highest numbers of cases were reported in the States of Bombay (28 000), West Bengal (27 000), Orissa (24 000), Andhra Pradesh (16 000) and Uttar Pradesh (15 000). The seasonal peak was reached in Bombay and Orissa in March, in West Bengal and Andhra Pradesh in April and in Uttar Pradesh in May. According to provisional data the incidence was low in India in 1959; the total number of cases reported up to 30 September being below 50 000.

In Pakistan the worst smallpox epidemic since the State was created occurred in 1958

in East Pakistan about 48 000 cases and some 22 000 deaths were recorded corresponding to a death rate of 53 per 100 000 population. The number of cases was no doubt still higher as the apparent case fatality rate reached 46%. The seasonal peak occurred in May in contrast with neighbouring West Bengal where the peak was reached a month earlier. In 1959 the number of cases decreased substantially but was still higher than during the six years preceding 1958.

Smallpox incidence was also high in Indonesia in 1958, cases occurring mainly in Sulawesi Province. Although the current notification of cases is incomplete, one outbreak in Butung Island south of Sulawesi was stated to have caused 5137 cases and 485 deaths in September 1958.

In April 1959 an outbreak of smallpox occurred in Singapore (10 cases). In July the disease appeared in the southernmost provinces (mainly Pattani and Yala) of Thailand accounting for some 1400 cases up to the end of September.

Europe

Imported infection caused two foci in Europe in 1958-59: one near Liverpool in the United Kingdom (5 cases) in April 1958 and the other at Heidelberg in Germany where the infection brought from India by a German physician caused 29 cases in December 1958 and January 1959.

Typhus

Ethiopia (4749 cases in 1958) is at present the main focus of typhus. Many sporadic cases are still notified in the Province of Egypt, United Arab Republic (533 in 1958), Ecuador (244 in 1958), Mexico (432 in 1958), Republic of Korea (190 in 1958) and Yugoslavia (216 in 1958).

According to provisional data for the first nine months of 1959 an increase in typhus incidence was recorded in the Province of Egypt (789 cases), Colombia (95 cases as against 31 in 1958), Afghanistan (40 cases as against 7 in 1958) and Turkey (0 cases as against 7 in 1958).

Relapsing fever

The only important focus of louse borne relapsing fever during recent years appears to be in Ethiopia. The number of cases (some of which no doubt are due to the tick borne form) officially notified in Ethiopia (including Eritrea) rose from 3220 in 1957 to 5009 in 1958. 4402 cases were notified during the first nine months of 1959.

Three cases ascribed to the louse borne

form were notified in the Belgian Congo in 1958 and 1 in 1959 while 3 cases were reported in Iran in 1958. Sporadic cases of relapsing fever of unspecified form were reported in 1958 in the following African and Asian countries and territories: Algeria (18), Portuguese Guinea (14), Nigeria (1), Somalia (1), Tunisia (5), Cyprus (1) and Republic of Korea (1).

During the first nine months of 1959 cases were reported in Tunisia (2) and Turkey (1).

Reports of Expert Groups

Requirements for biological substances

With the aim of promoting uniformity in the production and assay of important biological substances and in the standards to which these substances should conform WHO is convening a series of study groups whose task is to formulate requirements which can be internationally recommended. The reports of the first three study groups have now appeared. Each report consists of a brief summary of the general considerations of the group with recommendations for further studies while the requirements themselves are presented in the form of annexes. As far as possible the same general plan has been followed in each of the annexes: the various aspects of manufacture and control being dealt with in the same order under the same or comparable headings. It is the intention that any or all of the requirements

may be taken by national health authorities and used as they stand as definitive national requirements. Where appropriate explanatory or amplifying notes on the requirements have been added in small type. The requirements formulated are naturally subject to the limitations of present knowledge and in this sense must be considered provisional. This is recognized in the reports and provision made for future revision.

These reports are issued at the price of 1/9 \$0.30 or Sw fr 1 — each in the *World Health Organization Technical Report Series* as No 178 (manufacturing establishments and control laboratories inactivated poliomyelitis vaccine), No 179 (yellow fever vaccine, cholera vaccine) and No 180 (smallpox vaccine).

Food borne diseases

Centralization of food production and the mass distribution and consumption of food increase the risk of widespread outbreaks of food borne diseases. It is essential therefore that measures for the control and prevention of these diseases should be strengthened not merely in each individual country but also at the international level since foods are being

exported and imported on an ever mounting scale and tourist travel is continually increasing. If such measures are to be effective they must be based on proper notification of cases of food borne disease in each country and on the collation at the international level of the reports published by the public health administrations. In addition thorough epizootic

demiological surveys are required. In the report of the European Technical Conference on Food Borne Infections and Intoxications sponsored by the WHO Regional Office for Europe¹ the various control measures de-

sIGNED to promote the production of pure and safe food are reviewed. The report contains a series of recommendations on what the physician should do when faced with a case of food borne disease on action to be taken by the public health services and laboratories and on national and international measures for the control and prevention of such diseases.

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Notes and News

Malaria in Africa

A meeting of malariologists from all parts of Africa south of the Sahara was held by the WHO Regional Office for Africa at Brazzaville Republic of the Congo from 3 to 6 November 1959. The meeting was also attended by internationally known malaria experts from other parts of the world.

The many special problems presented by malaria in Africa were discussed. These include the remarkable intensity of transmission by the anopheline mosquitos and the unpredictable behaviour of the mosquitos themselves. There is also the problem of immunity in areas where transmission is intense and continuous: there is heavy loss of life among young children; however immunity begins to develop among the surviving children as they grow older and is very high in adults. If in such circumstances a malaria measures were only partly effective and were withdrawn the protected population having lost its immunity would be exposed to possible catastrophe by the re introduction of the disease. On the operational level there are problems of logistics, communications being poor or even absent in many parts of tropical Africa. There is also a dearth of trained personnel, particularly technicians and supervisors.

It is not known whether transmission can be interrupted by spraying with DDT alone throughout much of the African Region: the administration to the population of malaria suppresses mixed with common salt is the one being considered. This method is being tried out by WHO in an area of northern Ghana with a population of 60,000.

The meeting discussed applied research to overcome the technical problems which beset the malaria eradication campaigns in tropical Africa. For instance, because of the remarkable immunity of the adult population many persons with malaria parasites in their blood show no evidence of fever although they are carriers of the disease and a factor in its transmission. Finally there is always the possibility that mosquitos in Africa may develop resistance against DDT as they have already done against dieldrin in many parts of the continent. Further weapons must therefore be developed by malariologists and held in readiness against such an emergency.

Public relations and malaria eradication

The following examples drawn from WHO assisted programmes indicate the need for well organized health education both before and during malaria eradication campaigns.

In one part of Africa, spraying teams are finding more locked houses than before and less readiness to help by removing furniture. This is because dieldrin has replaced DDT and is proving much less popular. For one thing it is applied only once a year whereas DDT was applied twice: this has given people the idea that the spraymen are neglecting their job. Moreover there is less visible deposit from the dieldrin and this has given the impression that a "weaker" solution is being used. In addition the side effects of the spraying—particularly the temporary disappearance of rats from the premises—

are less marked than they were in the days of DDT

In another part of Africa DDT spraying had temporarily ended bed bug infestation. When however the bugs developed resistance refusals to admit the spraymen seriously jeopardized the success of the programme—in fact some of the inhabitants even threatened to beat the spraymen if they dared to return. Eventually it was decided to use a combination of DDT and BHC which it is hoped will prove effective. Whatever the outcome it is clear that the bed bug problem has become associated in the minds of the inhabitants of the area with the malaria campaign. Future policy will require careful control because experience elsewhere has shown that bed bugs can become resistant to BHC also.

The third example comes from a village of 270 inhabitants in the Western Pacific Region where a child died soon after the collection of blood samples. As a result of this the greatest difficulty was experienced in obtaining further samples. The team leader, using an interpreter, eventually managed to get 15 slides from the under 10 group, including one which showed *P. falciparum* infection with gametocytes. Unfortunately a second child died shortly afterwards and again it became almost impossible to get blood samples. A special effort has now been made to give the people the full facts with the greatest possible clarity and in their own language.

It appears that the only way to guard against such setbacks is to start propaganda early and to keep it going continuously, adjusting it to any changes in technique before they are made and reacting swiftly to any extraneous events that might have a bad effect on relations between the workers and the public. This applies to all phases of the programme.

Yaws in Haiti

A WHO Expert Committee on Venereal Infections which met in 1949 discussed the mass treatment of yaws with penicillin¹. The techniques available lent themselves to mass application, it felt, because of their simplicity, the non-toxicity and low cost of the antibiotic and the rapid epidemiological control over the disease

that they conferred. To demonstrate this it was decided that a large scale project should be carried out in a geographically delimited area with a high prevalence of disease, the attack being based on the use of repository penicillin preparations.

Haiti is a geographically well defined area and the prevalence of yaws there was high at that time. Indeed preliminary surveys showed 36.5% of the people to be affected. A campaign was begun in 1950 with assistance by WHO, UNICEF and the Pan American Sanitary Bureau. For practical purposes everyone with lesions was regarded as a case and the rest of the population as contacts. Mobile daily clinics were first set up in a small area; the main campaign was then organized, 97% of the population being examined and treated with penicillin in the form of aluminium monostearate (PAM). The whole country was covered by house to house surveys.

The first phase of the campaign lasted from 1951 to 1954. To prevent any recrudescence of the disease on a large scale the country was divided into 78 zones, each with an inspector in charge whose duty it was to seek and treat active cases of yaws and contacts. Supervision was inevitably inadequate, the staff being small, but spot surveys were carried out and infectious lesions diagnosed by microscope. In a later phase of the programme—from August 1956 to July 1957—house to house treatment surveys were made of foci found in follow up spot surveys where the prevalence of yaws was now 1.2%. A general estimate of the prevalence of the disease made at about this time put it at around 0.5% for the whole of the population.

The launching of a national mass smallpox vaccination campaign in July 1957 provided an excellent opportunity for combined operations. The yaws campaign continued on an increased scale. Case seeking activities and treatment were combined with smallpox work and a case finding division with a staff of 30 was formed to work in high prevalence areas. Unfortunately the smallpox campaign came to an end in November 1958 because of financial difficulties.

From November 1958 to May 1959 sample surveys of the population were carried out. These sample surveys covered 82,925 persons, i.e. 2.5% of the rural population (which was estimated to be about 3.5 million), evenly distributed over the

country Port-au Prince and all towns with a population of over 1000 were excluded. A team of six experienced yaws inspectors with a reserve was specially trained, the diagnosis of an infectious case depending on microscopic dark field demonstration of treponemes. All active cases were given 0.6 mega units of PAM and all contacts 0.3 mega units regardless of age. On the basis of the survey findings it was estimated there were some still 0.90 infectious cases in the island.

By June 1959 1600 of the infectious cases had been treated out of the total of 2090. The WHO medical officers in the campaign estimated that by the end of 1959 there would be no more infectious cases of yaws in the whole of Haiti.

Specifications for pharmaceutical preparations

A WHO Expert Committee on Specifications for Pharmaceutical Preparations met in Geneva from 9 to 14 November 1959. Its main subject of discussion was the preparation of a second edition of the *Pharmacopoea Internationalis* which is to be produced with the help of laboratories and specialists in many countries. A number of suggestions for improving and bringing up to date the text of the first edition were considered as well as proposed new texts for general procedures while some of the monographs describing pharmaceutical preparations were revised. Among other subjects discussed by the Committee were the classification of pharmaceutical preparations for reasons of safety and the possibility of supplying national health administrations with data on new pharmaceuticals. Arrangements were made for completing a series of specifications for reagents required to carry out the tests and assays described in the first edition of the *Pharmacopoea Internationalis*.

Expert Committee on Rabies

The WHO Expert Committee on Rabies met in Geneva from 14 to 19 December 1959 to revise previous recommendations in the light of recent findings. Research work on rabies which

has been carried out in different laboratories and co-ordinated by WHO was discussed. This work has been largely concerned with immunization against the disease and with its epidemiology in wildlife. Reduced schedules of vaccination and the effects of inoculations with immune serum have been studied as well as methods of eliminating the undesirable reactions or complications which sometimes occur after administration of vaccine. Other improvements in the production and testing of vaccines for human and animal use were considered as well as recent improvements in technical methods of diagnosing rabies and laboratory investigations on the virus.

The question of revising the WHO monograph *Laboratory Techniques in Rabies* in the light of developments since its publication in 1954 was considered. The Committee also reviewed progress in a world wide survey—recently started by WHO—of the incidence of rabies and the methods used to combat it.

BCG vaccine production

Representatives of five countries in the Western Pacific Region with laboratories producing BCG vaccine—Australia, China (Taiwan), Japan, the Philippines and Viet Nam—met at the WHO Regional Office in Manila, Philippines from 16 to 20 November 1959 to discuss technical problems involved in the production of this vaccine. By arrangement with the WHO Regional Office for South East Asia, the meeting was attended by representatives from India and Thailand.

The main topics discussed were BCG strains used for vaccine production (maintenance of strains and substrains, comparison of different strains) the preparation of BCG vaccine (age of culture, effect of pH on culture and vaccine clumping and the use of Tween 80) methodology of BCG vaccine control (techniques used in the counting of viable units, effects of different diluents).

Nursing administration in Europe

A European Conference on Nursing Administration, sponsored by the WHO Regional Office

d'Antonio, D. et al. (1954) *Laboratory Techniques in Rabies* (World Health Organization Monograph Series, No. 22).

for Europe took place in Bad Homburg Federal Republic of Germany from 11 to 20 November 1959. The participants included directors of nursing services and nursing schools, hospital administrators, medical directors and public health administrators concerned with nursing services from 24 European countries.

This was the sixth in a series of conferences organized by the WHO Regional Office for Europe to study various aspects of nursing today and to prepare for demands expected to be made on nursing services in the future as a result of changing concepts of health care. Its subject has vital implications in all fields of nursing since without good administration effort is wasted, morale deteriorates, the sense of vocation may be dimmed and progress may be impeded. The specific subjects discussed included philosophy of administration, sociological and psychological aspects of administration and the training of the nurse administrator.

Co-ordination of smallpox campaigns

A co-ordination meeting on smallpox was held by the WHO Regional Office for Africa at Brazzaville, Republic of the Congo from 16 to 19 November 1959. Data on the distribution of the disease in the Region have been collected during an enquiry made by WHO as part of its programme for the eradication of smallpox throughout the world. The distribution in Africa proved very uneven; considerable areas were completely free from the disease while there were endemic foci in others, particularly on the west coast and in central Africa. In most of the latter areas, antismallpox campaigns are being planned and the meeting was called to co-ordinate and reinforce them.

One of the main problems considered was the indifference or even opposition to vaccination on the part of certain populations, often due to religious convictions, tribal beliefs, superstition or lack of education. In one rural area it was reported that tribal chiefs even organized resistance against the campaign. Health education services are therefore being organized to overcome such difficulties.

Regional Conference on Malaria Eradication

A Regional Conference on Malaria Eradication was held by the WHO Regional Office for the Eastern Mediterranean at Addis Ababa, Ethiopia from 16 to 21 November 1959. It was attended by malariologists from 12 countries and by representatives from the headquarters of WHO and ICA (International Cooperation Administration) and the area office of UNICEF.

The discussions came under four main headings: planning administrative and financial aspects of malaria eradication programmes; technical problems connected with spraying and surveillance; technical problems arising from nomadism and insecticide resistance and international co-ordination. The status of antimalaria programmes in the Eastern Mediterranean Region and in neighbouring countries of the African Region was reviewed. The results of malaria eradication pilot projects in Ethiopia, the Sudan and Somalia were discussed, as well as the findings of the pre-eradication surveys in Tunisia and the Province of Egypt, United Arab Republic and the procedures used in these surveys.

Spreading agents in larvicides

The surface film on natural waters to some extent impedes the spread of droplets of oil from larvicide sprays. It has therefore been assumed that larvicidal oils with a high spreading pressure would be more effective than others. As certain reports threw doubt on this assumption, it was decided to test it experimentally.

In an article which has just been published in the WHO Bulletin¹, A. S. Msangi of the East African Institute of Malaria and Vector Borne Diseases describes trials with two forms of larvicide: one containing a spreading agent (spreading pressure 36 dynes/cm) and one without (spreading pressure 16 dynes/cm). The trials were carried out on *Anopheles gambiae* in tanks and also in flowing water.

The results of the trials suggest that the assumption that the spreading capacity of an oil can be improved by an agent capable of overcoming the often high surface tension of the water is a purely

theoretical one. In the field atmospheric conditions play an important part: wind and rain breaking the surface film and facilitating the spread of the oil. Moreover there is no proof that larvae are killed solely by direct contact with the oil. Some workers have obtained good results with a 5% solution of DDT dropped on mats of algae in ditches where the oil did not spread. There are various possible explanations for this: in evaporating for example the oil may leave behind crystals of insecticide suspended in water and these may be absorbed by the larvae or pollen grains or particles of dust falling on the water surface may become impregnated by the insecticide and then used by the larvae as food.

Epidemiology of A2 pandemic influenza

Several aspects of the 1957-58 influenza pandemic in the Netherlands are of special interest in the epidemiology of the disease in general. The pandemic reached the country in June 1957 at a moment when the incidence of respiratory diseases was at a low level. It was thus possible to gain an exceptionally clear picture of its development and course.

The disease was introduced by boat and aircraft from Indonesia and perhaps from the eastern Mediterranean area, provoking an epidemic which lasted for ten months. In an article on the epidemiology of pandemic A2 influenza in the Netherlands—shortly to be published in the WHO Bulletin—J. Mulder and N. Masareel discuss primary and secondary foci, means of propagation and morbidity and mortality rates (there was 1 death per 3700 inhabitants as against 1 per 20 inhabitants in the 1918 pandemic). They also give the results of serological analyses among important groups of the population.

The community-wide outbreak observed in September-October 1957 was preceded about two and a half months earlier by a series of local outbreaks. This is a phenomenon which had already been observed as long ago as 1896 but owing to the absence of virological confirmation it is not known whether the preliminary and general outbreaks at that time were caused by the

same virus. The serious epidemic which broke out among 18 000 Ambonesians in more or less isolated camps in the Netherlands in 1957-58 provides a clear-cut, possibly unique illustration of the role of overcrowding in the propagation of the disease: almost 85% of the persons in these camps being affected.

The influence of climate in the epidemiology of influenza has always been a much discussed point. In the present case it appears that fine summer weather up to late August retarded the spread of the infection in the northern hemisphere and that a recrudescence of the disease between January and March 1958 was favoured by wintry conditions. The rather abrupt appearance of a community-wide wave lasting for about two months is difficult to explain except by an extensive seeding of the virus during the preceding period. The prevalence of A influenza for a period of six months after the main wave had subsided shows that the virus was apparently able to maintain itself in a partially immune population for some time.

Accidental death of two WHO doctors

Dr Manuel Gauthier and Dr Jean Fraisse, two WHO staff members of French nationality, died as the result of a motor-car accident near Ibadan, Nigeria, on 3 December. Both were working in a yaws campaign centred at Enugu in the Eastern Region of Nigeria.

Dr Gauthier was born in 1913 at Orbec, Calvados, France. He completed his medical studies in Paris and subsequently obtained a degree in public health at the University of Montreal. He joined the health services of the French army and worked in Indochina and in North Africa. He was engaged by WHO in 1951 and put in charge of tuberculosis campaigns in Iran, Viet Nam and Cambodia. He took up his post in Nigeria in 1958.

Dr Fraisse was born in 1910 at Santa Rosa, Mexico. He attended the Lycée Pasteur in Paris and studied medicine at the University of Paris. After working for the French army health services in Viet Nam and Laos, he joined WHO in 1955 and was assigned to the yaws campaign in Nigeria.

People and Places

Research on relapsing fever

Dr Helene Sparrow Germa of France was recently appointed to advise on the preparation of a research programme on relapsing fever as part of WHO's expanded programme of medical research

Louse borne relapsing fever the causal agent of which is *Borrelia recurrentis* is a quarantinable disease. During and after the two world wars it caused veritable pandemics which affected millions of people in eastern Europe, Africa and the Eastern Mediterranean Region. It was also prevalent in India and China.

Dr Sparrow Germa working with Charles Nicolle at the Tunis Pasteur Institute made a fresh study of this disease during an epidemic in Tunisia between 1943 and 1946 when 400 000 cases occurred among a population of 2 500 000. The *B. recurrentis* strains then isolated were studied and maintained at the Tunis Pasteur Institute. Knowledge of these strains particularly as regards the conditions governing transmission of the disease to man was extended through their successful use in the recurrentotherapy of general paralysis in two Tunisian hospitals for mental patients. However the complete disappearance after 1946 of louse borne relapsing fever in Tunisia left the problem of the origin of the epidemic unsolved.

In 1955 to help in clearing up this problem WHO enabled Dr Sparrow to visit Ethiopia where the two forms of relapsing fever—tick borne and louse borne—co exist endemically with seasonal flare ups. Study of the strains isolated during this investigation in Ethiopia was continued at the Tunis Pasteur Institute and in various other centres to which Dr Sparrow forwarded them. Several papers on the subject have been published since 1955.

In showing that the endemo-epidemic strains of *B. recurrentis* found in Ethiopia are identical with those isolated in Tunisia during the 1943-46 epidemic Dr Sparrow's investigations confirm epidemiological findings which suggested that the high plateaux of East Africa and

perhaps of Central Africa constitute dangerous foci from whence louse borne relapsing fever has spread as a result of troop and population movements during and after the Second World War.

Dr Sparrow's work also shows the importance of carrying out other investigations so as to clarify possible relationships between the two forms of fever and to define precisely their areas of distribution in East Africa (where a considerable number of cases are notified every year without the differential diagnosis being given). This would help in the elimination of the focus which seems responsible for the recent epidemics. There can be no doubt that in the light of the incidence of louse borne diseases and particularly the high number of relapsing fever cases notified during recent years, population movements which take place over large areas of Africa without any sanitary supervision must be viewed with some concern.

Yaws in Ceylon

A campaign against yaws in Ceylon began soon after the First World War. Steady progress was made until about 1935 after which the campaign was continued less intensively by teams of three who visited endemic areas and treated cases.

In 1955 a yaws survey was made in an area of the Central Province and only three cases of early yaws were seen; there was some hyperkeratosis of the soles and a high sero positivity rate. Another survey was carried out in the Southern Province in 1957; no cases of early yaws were found and only 0.1% of the population suffered from late non-infectious yaws. These two surveys suggest that the prevalence of yaws has now been greatly reduced in Ceylon.

Dr L. H. Turner has gone as a short term WHO consultant to Ceylon to study the present low prevalence of yaws in the island and to endeavour to find out the principal factors responsible for this reduction. Dr Turner has been working for the past eighteen years in Malaya and for the past five years has been engaged in research on

virology and leptospirosis at the Institute of Medical Research Kuala Lumpur

Bilharzias epidemiology and control

Dr George Macdonald recently visited various countries in the African Region on behalf of WHO to report on the significance of bilharzias infection in relation to the general health pattern the form of preliminary survey needed as a background to bilharzias control and research needs in this connexion. Dr Macdonald is Director of the Ross Institute London School of Hygiene and Tropical Medicine and has been extending to bilharzias an epidemiological approach which has already been found valuable in the field of malaria.

Dr John G. Oughton will spend two years in Iran as medical zoologist on a WHO team which is planning a bilharzias control programme in that country. He will there study snail ecology and advise on snail control. Before going to Iran he will undertake a similar assignment in Iraq for a short period. Dr Oughton was educated at the University of Toronto, Canada, and has held positions with the Royal Ontario Museum of Zoology and the Department of Entomology and Zoology, Ontario Zoological College.

Ophthalmic leishmaniasis in the Sudan

Dr Javier Torroella of Mexico has been appointed WHO consultant for an ophthalmological survey of the provinces of Equatoria and Bahr-el Ghazal in the Sudan where there is a high incidence of blindness due to onchocerciasis. His task will be to select the most suitable areas in which to try out control methods and to obtain data for future evaluation of the situation. A consultant on entomology will subsequently visit the area and advise on methods of vector control.

Dr Torroella is Chief of the Clinic of the Ophthalmological Department of the National Faculty of Medicine University of Mexico and consultant ophthalmologist of the General Hospital and Institute of Tropical Diseases, Mexico City.

Malaria appointments

Dr Cheng Teh Chen, Director of the Taiwan Provincial Malaria Research Institute, has been appointed adviser in the malaria unit of the WHO

Regional Office for the Western Pacific. In this capacity he will help the Senior Regional Malaria Adviser in his task of speeding up malaria eradication throughout the Region. His duties will include making periodic visits to field projects to supervise WHO malaria field staff and providing technical advice on the various phases of eradication. He will also help to analyse, assess and report on malaria programmes in the Region, estimate programme requirements, and take part in programme planning. Dr Chen obtained his medical degree from the National Taiwan University, Taipei, and holds the degree of Master of Public Health from Johns Hopkins University, Baltimore, Md., USA. He has been associated with malaria work for the past ten years and for some time was in charge of the malaria eradication programme in Taiwan.

Dr M. E. Farinaud will act as WHO co-ordinator and senior adviser to the Pakistan Government in connexion with a malaria pre-eradication survey now being carried out in that country. He will be assisted in this task by consultants in epidemiology, entomology and malaria engineering and will co-ordinate the work of two teams—each composed of a malariologist, an entomologist, a sanitarian and a laboratory technician—which will work in East and West Pakistan respectively. Dr Farinaud first worked for WHO on a malaria programme in Viet Nam in 1951-5 and since then has acted as short-term malaria consultant for the Organization in various parts of the world.

Dr Alan Gilroy, Director of the Indian Branch of the Ross Institute, is taking part in the pre-eradication survey in Pakistan for a period of three months during which he will study the epidemiological data collected by the two WHO teams. Dr Gilroy is a well-known malariologist of wide experience and has frequently served as a short-term consultant for WHO.

Dr Mario Maffei has been appointed adviser in the malaria unit of the WHO Regional Office for Africa. His duties will be similar to those of Dr Cheng Teh Chen (see above) in the Western Pacific Region. Dr Maffei has for the past six years been director of the malaria service in Somalia, being responsible for the conduct of epidemiological and entomological surveys as well as spraying and other activities. He studied in Italy and, in addition to his medical degree, holds a

diploma in tropical medicine Before his appointment in Somalia he worked in tropical areas of Africa and the Americas and in South East Asia

Dr B S J de Meillon has been appointed entomologist in the malaria unit of the WHO Regional Office for Africa In this capacity he will assist the Regional Malaria Adviser in the over all conduct of all malaria projects in the Region including the planning of entomological procedures in pre eradication surveys and entomological appraisal in the attack and consolidation phases of eradication programmes He will also supervise and advise entomologists working in the field Dr de Meillon has served with the South African Institute for Medical Research for the past twenty three years He has been entomologist on a WHO malaria eradication advisory team in Iraq and has already assisted the Regional Office for Africa as a short term consultant on entomology

Dr E J Pampana former Director of the Division of Malaria Eradication at WHO Headquarters recently served as instructor on the epidemiology of malaria at a course for senior malaria officers held at the Malaria Eradication Training Centre Cairo Province of Egypt United Arab Republic The Centre which was set up by the Egyptian authorities with technical help from WHO trains medical officers engineers entomologists sanitarians and technicians from a number of countries in the Eastern Mediterranean Region Dr Pampana has carried out similar assignments in Jamaica and Turkey

Dr Shaikh Mohamed Rafi of Pakistan recently went to Jordan to direct a malaria eradication campaign which is being carried out with help from WHO The holder of a DPH from the London School of Hygiene and Tropical Medicine Dr Rafi has had wide experience of antimalaria activities in the Punjab West Pakistan and East Bengal

Mental health appointments

Dr G M Carstairs of the Institute of Psychiatry Maudsley Hospital London is to advise the

WHO Regional Office for South East Asia on the organization of epidemiological surveys of mental illness In the course of this assignment he will visit the All India Institute for Mental Health in Bangalore and other medical institutes and mental hospitals in India and Thailand Dr Carstairs was recently put in charge of the newly created social psychiatry unit of the Medical Research Council of Great Britain

Dr Morton Kramer has been asked by WHO to examine the value of mental hospital records in epidemiological surveys of mental disorder In this connexion he will visit Australia China (Taiwan) India Japan and the Philippines Dr Kramer is a leading biostatistician and Chief of the Biometrics Branch National Institute of Mental Health Bethesda Md USA In 1957 he was a member of the WHO Study Group on Ataractic and Hallucinogenic Drugs in Psychiatry and in 1958 he took part in the technical meeting on epidemiological methods in mental health which was sponsored jointly by the Milbank Memorial Fund the Medical Research Council of Great Britain the World Federation for Mental Health and WHO

Dr Erich Lindemann Professor of Psychiatry at Harvard Medical School has been appointed by WHO to advise medical schools in India on the teaching of psychiatry A specialist in social psychiatry Dr Lindemann was educated at the Medical Academy of Giessen Federal Republic of Germany He was a member of the WHO Study Group on Ataractic and Hallucinogenic Drugs in Psychiatry which met in 1957

Leprosy Advisory Team

Dr K M Patwary of India has been appointed statistician on the recently created WHO Leprosy Advisory Team Educated in India and the United States Dr Patwary has done post graduate research on medical statistics at the National Academy of Sciences Washington D C Before taking up his assignment with WHO he was lecturer at Howard University College of Medicine Washington D C

Review of WHO Publications

PSYCHIATRIC SERVICES AND ARCHITECTURE

Psychiatric Services and Architecture by A. Baker
R. L. Davies & P. Sivadon. Geneva 1959
(*Public Health Paper No. 1*) 59 pages. Price
3 6 50 60 or Swiss fr. — French edition in
preparation.

In man's development, say the authors of this new WHO publication, there is a close parallel between his relations with other human beings and his relation with his environment. Both begin with the utmost simplicity but develop and differentiate until he has multiple and complex relationships in a large and complicated living area. The baby needs only his mother and can live in a cot. The infant lives in a world populated by his parents and siblings and needs only bed space and the immediate home area. The child finds personal relations with his family and children in the area and will use his home, his street or village and his school. The adult has multiple personal relationships and will live in his town, may travel to other countries and needs working space and social areas.

Psychiatric illness reverses this development by restricting the patient's relationships and plunging him into an isolation which increases as his illness grows more severe. Modern treatment seeks to restore him to community life and to the wealth of relationships of the normal adult—not—as has been the fashion until recently—to aggravate his isolation by confining him in a prison-like institution where his liberty is restricted, companionship is largely denied him and he is treated as an outcast and sometimes like a criminal. It follows from this that as far as possible he should be treated in the community and in the environment to which he is accustomed. If he is treated at home the other members of the household should be given guidance and support in dealing with him and the resources of outpatient departments employed

If he is too ill for home treatment a day hospital may suffice. Only if he is too disturbed for these measures should he be admitted to full hospital care.

The mental hospital should be regarded as a temporary treatment unit as a place where re-education for life and society can be carried out in the most effective manner possible but without keeping the patient any longer than is absolutely necessary. It used to be thought that as many as a third of all psychiatric patients would become long-term inmates of institutions but now the proportion is estimated at 5% or less and it has even been suggested that only patients with progressive organic dementia need remain for any length of time.

The psychiatric services should be run by teams of doctors, social aides, nurses and others working in close conjunction and forming part of the larger mental hospital teams. This system provides for personal contact and for the greater security of the community against the occasional dangerous patient. In the past many patients were secluded for fear of occasional aggressive outbursts but these are too uncommon to justify routine incarceration. Compulsory seclusion—together with the remoteness and for-bidding aspect of many mental hospitals—indeed had the effect of preventing treatment from being sought early by patients or their friends. Personal contact is of the greatest importance in treatment. A patient is happier if he sees a doctor he knows through all the stages of treatment, at home at the outpatient clinic or in hospital; this applies equally to the auxiliary staff.

Architecture and design come into the picture throughout treatment. At the outpatient clinic the doctor's office should not be too large or it may overpower or frighten the patient; it should be reasonably soundproof and not overlooked and it should not have a communicating door to give the patient the impression that a confidential discussion may be interrupted at any moment.

The day hospital of the type now being developed in some countries should be near the centre of the population it serves and be convenient for transport. It will contain individual rooms for psychotherapy or physical treatment and larger rooms for group therapy, occupational therapy, work therapy and physiotherapy as well as the usual staff quarters. In these hospitals as in all other treatment units the patient should be received by one person and his initial contacts should take place in a small area with a limited number of people. No long dark corridors or lofty gloomy rooms where he is left alone or surrounded by large numbers of other patients should be allowed.

The mental hospital should be sited close to the community it serves not in a remote place where contact between the patients and their relatives is restricted, transport facilities are bad and the isolation not only affects the patients adversely but makes staff dissatisfied and difficult to obtain. The patient should be encouraged to establish personal relationships first with a small group then with larger ones. The wards must therefore be small enough for the patient to feel secure to have some privacy but not to feel isolated and in the group in which he lives he should be encouraged to strike a mean between security and independence. Familiarity with places and persons increases the patient's sense of security and the hospital should be arranged to help him orient himself without difficulty. Orientation in time is as important as orientation in space; there should therefore be clocks and calendars, events at fixed times during the day and newspapers daily which will not only preserve his sense of time but also keep him in touch with the world outside the hospital.

The mental hospital should contain all the facilities required for work therapy covering all activities from the simplest to the most complex. They will be based essentially on local traditions of work so that the patient does not find himself engaging in an unaccustomed or outlandish activity. For the development of personal relationships there should be gatherings of a passive character e.g. for cinema shows, television and talks and also of an active character to organize games and entertainments for example or to take part in the running of the hospital by means of committees. Plenty

of scope should be allowed the patients to transform their material environment by decorating rooms, painting or converting buildings. A fully equipped social centre is a necessity. Living quarters and essential areas should be designed to form a community not unlike a village in which the medical centre would be a separate building or group of buildings. There should be specialized units for mothers and babies, children and old people. The booklet contains plans illustrating the lay-out of a suitable hospital and its wards.

Separate institutions may be required for psychiatric patients with antisocial tendencies for alcoholics and drug addicts and for epileptics and the mentally defective.

When the patient leaves hospital he enters upon a critical stage. Re-adaptation to normal life requires an atmosphere of security and this he may not get if there is no intermediate stage between his living in hospital and being thrust out into the world to fend for himself. An after-care home provides an area of security within the community and as such it should be architecturally independent of the hospital and similar to other houses in the town, looking like a private house or small hotel and having no external characteristics distinguishing it as a treatment or welfare institution. From the after-care home the patient should be encouraged to go out into the community to work. The home should not be so organized as to enable him to find everything he wants in it so delaying his reintegration into society.

Not all patients will be fit to return to the community. Some of them temporarily or permanently will need sheltered workshops where the conditions enable them to do work which may be as good as if not better than the work of the normal person. Others the "long stay" schizophrenic population need a working settlement, the patients providing labour for farms in the rural areas and doing unskilled work in the towns.

The new approach to the problem of psychiatric buildings sketched in this booklet is a town planning rather than an architectural approach which substitutes for the heavy institutional style so evident in Europe and North America a humanized one combining variety and flexibility and conveying to the occupants a feeling of

belonging to a community. The authors discuss and illustrate with plans how such a hospital should be designed. Recognizing however that in many places there is small likelihood of new mental hospitals being built they describe the conversion of existing hospitals to make them fit for modern use. In new as well as in converted buildings the question of function and design raises problems of daylighting and artificial lighting, colour, noise and heating and ventilation and these subjects are examined in turn. A final section is devoted to the architecture of psychiatric buildings in tropical countries.

Although this booklet primarily represents the views of three WHO consultants—two psychiatrists and an architect—the first draft was revised in the light of extended discussions between them and WHO staff members. The manuscript was then circulated among members of the Expert Advisory Panel on Mental Health and other distinguished psychiatrists and hospital architects throughout the world and the final text took into account the views of 29 psychiatrists from 13 countries and 4 architects from 3 countries.

DIARRHOEAL DISEASES

Bulletin of the World Health Organization 1959
Volume 1 Number 3 (pages 445-390)

In the past the diarrhoeal diseases were the principal cause of death among infants and children in practically all countries of the world and they still are in many. Indeed they are almost certainly a much more important cause of morbidity and mortality than statistics show them to be for they are most common in the less developed countries where medical services are lacking and disease and death are either misreported or not reported at all. The difficulty of obtaining a clear picture of their incidence and prevalence in the world is complicated by two additional factors. One is that their etiology is multiple: there is still no general agreement on the amount of diarrhoeal disease caused by each of the organisms most generally incriminated: *Shigella*, *Salmonella*, *Escherichia coli* and the enteroviruses or on the role of malnutrition. This is not surprising since the diarrhoeal diseases are so widespread and have so many

symptoms in common that all cases require a full laboratory investigation for the identification of the causative organisms and this they are least likely to get in the very countries where they most frequently occur. The other complicating factor is the wide and confusing range of terms used to describe the diarrhoeal diseases. These vary so greatly not only from country to country but also within countries that the chances of a uniform classification of the diseases and international comparability of the statistics on them are much impaired.

The papers in this number of the Bulletin deal with some of the problems of the diarrhoeal diseases and describe the situation in some of the countries in which they are most prevalent. Hormaeche & Peluffo write on the laboratory diagnosis of *Shigella* and *Salmonella* infections. Many methods have been evolved for the isolation of the causative agents of the diarrhoeal diseases not all of them as effective as they might be. In order to ensure that diagnostic methods are as internationally representative and acceptable as possible WHO has requested well known experts to write a series of studies on the laboratory diagnosis of certain diseases and this is one of them. It has been read and approved by a number of experts from different countries and may be taken as representative of accepted international opinion.

Newell deals with one of the groups of organisms most incriminated in the diarrhoeal diseases the salmonellae. Salmonellosis he points out is of world wide distribution and of high incidence but of low mortality. Since the symptoms are often felt to belong to the natural order of things are clinically non specific and are frequently confused with other forms of gastro-enteritis even an efficient notification system or a laboratory reporting service is unlikely to result in an accurate estimate of its incidence as the author shows from examples taken from the United Kingdom.

The source and methods of spread of the salmonellae are examined and contributory factors such as personal susceptibility and local customs and habits evaluated. Control of the disease depends on a fuller knowledge of the causative agents and must take into account animal reservoirs and the mode of transmission from animal to animal.

Linetskaya Novgorodskaya reviews recent developments in the epidemiology of acute intestinal infections of non dysenteric origin with particular reference to findings in Leningrad. The ingestion of foodstuffs infected with salmonellae she points out is only one of the possible modes of infection and not the most frequent. Children and adults who have had the disease continue to excrete salmonellae for a lengthy period thus acting as an important source of infection. In maternity hospitals the mother infects the baby during childbirth and the baby spreads the infection to other babies. These findings shed light on the processes of infection and help simplify the task of control. *E. coli* is of the greatest danger to infants because of its association with epidemic diarrhoea. Research is required into its epidemiology and especially into the suggestion that the main reservoir is not in animals but in man.

Hardy traces the changes in the pattern of mortality from diarrhoeal diseases among infants and children throughout the world linking the decline in mortality in the more developed countries with improved standards of living and sanitation. Epidemiologically two major types of diarrhoeal disease are observable in children: the acute episode occurring in the previously normal well nourished infant or child tending to be more frequent in the summer and the chronic progressive form most commonly found in the less developed countries associated with malnutrition and retarded development less severe than the acute episode but tending to persist or recur. Hardy examines the etiological role of the principal causative agents and outlines a series of studies to advance our understanding of these diseases.

A group of papers are devoted to studies of diarrhoeal diseases in specific countries and territories in what was formerly French West Africa in the Philippines and in Venezuela. In all of them these diseases exact a heavy toll of life, social and economic conditions favour their persistence and statistical services are inadequate so that the full extent of the problem is obscured. Curiel & de Ochoa propose measures for ensuring the comparability of statistics of gastro-enteritis in Venezuela. Davis and co workers deduce from an analysis of certificates of death that failure to seek medical advice early enough and inadequate

treatment contribute largely to the number of deaths in Manila. Senecal sees prevention in West Africa as a long term undertaking to be achieved by stages.

Emili then discusses the diarrhoeal diseases in Yugoslavia with particular reference to Croatia. Investigation of the etiology, epidemiology and prevention of these diseases is in his view one of the most compelling tasks facing the public health authorities because of their high incidence and great importance. He outlines a programme of investigation on a wide front to include statistics, a study of the etiology, an inquiry into the effects of sanitation and a trial of methods of chemoprophylaxis.

In Brazil the number of children under two years of age killed by the diarrhoeal diseases is greater than the number of persons of all ages killed by plague, smallpox, yellow fever, influenza, malaria, typhoid fever, whooping-cough and diphtheria. Penido describes how Brazil has sought to cope with this problem by rehydration centres, home visiting by nurses, the training of specialized personnel, the establishment of blood banks and lactaria and environmental sanitation. In a paper about the USSR Maslov & Grechishnikova attribute the tenfold decrease in the mortality from the diarrhoeal diseases since 1913 to the measures taken against them and to the improvement in the material and cultural standards of the people. A network of child clinics has been created, expectant mothers are well cared for and every effort is made to see that from birth children are properly looked after and fed in accordance with sound dietic principles.

The next paper by Yekutieli describes the methods and results of a field study conducted over a period of 4 months in 1954 among 700 children up to 3 years of age belonging to families which had immigrated into Israel since 1950. It is followed by Schliessmann's review of the evidence in favour of the widely held thesis that improvements in environmental sanitation are responsible for the sharp decline in mortality and morbidity from the diarrhoeal diseases in some parts of the world. He considers in turn the provision of a safe and adequate supply of water in each home, sanitary methods of excreta disposal and prevention of faecal pollution of water supplies, prevention of access by flies and

other vectors of disease to human and animal faeces the building of rodent and vermin proof houses with sufficient floor space and sanitary control over milk and other foodstuffs

The last paper is concerned with the etiology of the diarrhoeal diseases in general. Buttiaux points out that intestinal parasites (protozoa or helminths) are possible causes as well as bacteria and the enteroviruses and so too are enterotoxins staphylococcal or streptococcal or even excessive numbers of usually harmless bacteria. Buttiaux pays special attention to the role of *E. coli* in infantile diarrhoea which is as yet obscure.

MENTAL HEALTH

Bulletin of the World Health Organization 1959
Volume 21 Number 4-5 (pages 391-664)

The study of mental ill health today is remarkable for its freshness of approach to old problems. The mental patient is no longer seen as an individual apart from society who should be isolated in gaunt lonely barrack like institutions far from towns but as a member of the community who should be reintegrated into it as soon as possible and who will benefit from sympathetic understanding instead of strait jackets and from surroundings that will not be as they so often are in dismal contrast to those in which he has been living. Hospitals have been thrown open patients are being encouraged to go into hospital voluntarily the amount of restraint and of seclusion has been greatly reduced attempts have been made to persuade the patients to organize themselves and there is a movement towards using psychiatric out patient departments at local general hospitals as bases for the home treatment of patients. A paper in this issue of the Bulletin by Sandison from France describes the successful conversion of an old fashioned lunatic asylum into a modern mental hospital with treatment for the patients based on these new ideas.

A great part of the current reappraisal of the treatment of mental illness is due to the revived interest in the effect of drugs on the disordered mind. Drugs have been used for many years in treatment, but neither the bromides the barbi-

turates insulin nor the others have aroused anything like the interest or hope that have been kindled by the vast number of new compounds now available. There is already a comprehensive literature on these psychotropic drugs or psychopharmaceuticals as Kline in a paper in this issue suggests that they be called. But the number of new drugs is so large and there is such confusion so many contradictory findings about their properties their side effects and even their names that attempts to bring some order into the field short lived though they must inevitably be in such an expanding field cannot fail to be of some value. Such an attempt was made by a WHO study group which met in November 1957 to take stock of ataractic and hallucinogenic drugs used in psychiatry and to define those areas which in their view required the most urgent inquiry. Some of the papers in this issue are revised versions of working papers submitted to this group.

An essential preliminary to the study of the drugs which influence psychological states is a clinical classification which will indicate the purposes for which they are used. Kline of New York provides this along with an account of their principal side effects and the means of obviating them. In another paper Jacobsen of Copenhagen discusses the comparative pharmacology of some psychotropic drugs their effects on the different levels and different functions of the central nervous system, and the possible relationships between their central effects. He lays most stress on experiments conducted on animals mentioning observations on human subjects only in so far as they have the character of experiments.

On the other hand in two other papers Sandison of England is concerned with human subjects with the role of psychotropic drugs in individual and group therapy. The first pays particular attention to lysergic acid diethylamide (LSD) a compound with hallucinogenic properties which has only recently along with mescaline become of interest to persons other than students of primitive peoples and religions. LSD he claims helps bring to the surface unconscious material which is inaccessible to standard methods of analysis and it should find a place among those drugs which improve the quality of the patient's understanding and help

control his symptoms. The second of Sandison's papers arises from the well known observation that the action of certain drugs varies according to the mood of the individual and according to his environment. Psychotropic drugs form no exception to this rule. The psychological phenomena induced by deep insulin therapy for example differ according to whether treatment is given to individual patients or to a group of patients: indeed the therapy is effective to the extent that it helps the patient to become a full member of the group. This is true of many psychotropic drugs but the subject has not yet been adequately explored.

The last paper on the psychotropic drugs by Lindemann of Harvard discusses the relation of the mental changes they induce to psychoanalytical theory. These drugs cannot be said to cure mental disease but they do modify the personality structure and the perceptive, integrative and executive functions of the ego and so may encourage the appearance of greater adaptability in the patient and more adequate patterns of behaviour.

The next group of papers deal with mental health problems of the aged and aging problems which are assuming increasing importance as the proportion of older people in the populations of the world rises. The incidence of mental and physical ill health increases with age for obvious biological reasons but there is a wide range of variation in the extent to which the faculties decline and the best hope of controlling or delaying the process of aging lies in the study of the reasons for this variation. Such a study will not confine itself to medicine but will call upon psychology, sociology, physiology, genetics and other disciplines. This is clear to the authors of the papers. Roth, from England, who writes on mental health problems of aging and the aged in general, discusses *inter alia* the social factors, the relationship between mental and physical health and the value of fostering physical well being and healthy adjustment during the earlier stages of life.

Bash from Switzerland examines the problem of mental health in old age from the standpoint of Jung's analytical psychology. The individual is born with a tendency towards either an extravert or an introvert attitude to life but he must in order to make his way in the world

develop an extravert attitude which will enable him to satisfy his biological drives. At the decline of life however this attitude no longer suffices and mental health or ill health will result according to whether or not he can develop an introspective attitude and take advantage of the possibilities latent within him.

A paper by Sjogren and Larsson from Sweden discusses the difficulties of investigating mental illness in the old and illustrates them by means of an inquiry carried out into the senile psychoses in Stockholm. Then Townsend from London examines the social surveys of old age conducted in Great Britain between 1945 and 1958. Much of the evidence collected is repetitive, much is poorly analysed and some is no more than slight. But there is agreement that most of the aged lead a reasonably secure life within their families and are given care whenever they require it, only a minority—consisting of those confined to the house, those without relatives or contacts with society and those who could do some work but are given no work to do—being in need. It is in this minority that mental illness is most widespread.

The last paper in this issue of the Bulletin by Stengel from England deals with the vexed question of the classification of mental disorders. Diagnoses can rarely be verified objectively and the same or similar conditions are described under a confusing variety of names. Stengel surveys existing systems of classification critically and sets forth certain basic principles on which he believes a more satisfactory classification could be constructed.

* * *

Not a little of the credit for the present progressive and humane outlook on mental disease is due to the World Federation for Mental Health, an international non-governmental organization founded in 1948 which works in close co-operation with WHO. Under its auspices a World Mental Health Year has been inaugurated which began in April 1959. The Federation proposes during this year to embark upon a programme which will deal with the needs of children, the teaching of the principles of mental health, the sociological aspects of industrial change and mental health and the psychological

problems of migration and will also aim at promoting national surveys in the field of mental health and ill health. These are not projects which can be carried out within the limits of a single

year; recognizing this the Federation contemplates a major effort for about two years and the continuation of many of the projects for a considerably longer period.

CORRIGENDUM

Vol 13 No 12

NOTES AND NEWS

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delete 90-95

insert 15-10

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WORLD HEALTH ORGANIZATION

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HEALTH SERVICES IN THE USSR

As part of a plan to give public health workers first hand experience of the organization and functioning of health services in countries other than their own WHO arranged a special study tour to the USSR in which 23 health workers of one kind or another from 21 countries throughout the world took part. This group spent more than five weeks in the USSR at the end of 1958 travelling about a great deal listening to Soviet specialists and seeing as much as possible of the country's health services. In the time at their disposal the group did not—indeed could not—see all that there was to see and so some of the information incorporated in their report¹ is derived from government sources.

The health services of the USSR are organized to provide comprehensive medical care for the whole population free of charge through curative and preventive services integrated at all levels. Planning and supervisory services are in general highly centralized but executive services are decentralized so that nine tenths of all problems can be dealt with locally. The general administrative structure of the health services is shown in Figs 1 and 2.

In addition to the ministries of health the health departments and the hospitals and clinics which they control there are special institutions or bodies concerned with health. Thus the Academy of Medical Sciences acts as a centre for co-ordinating the work of a whole series of scientific research institutes scattered over the country as well as doing research itself. The scientific research institutes give post graduate training to physicians, scientists and research workers. Council of specialists advise the ministries of health and the larger health departments on methods of work and on suitable modifications in procedure. Medical education is the responsibility of medical schools and insti-

tutes for post graduate training under the Ministry of Health.

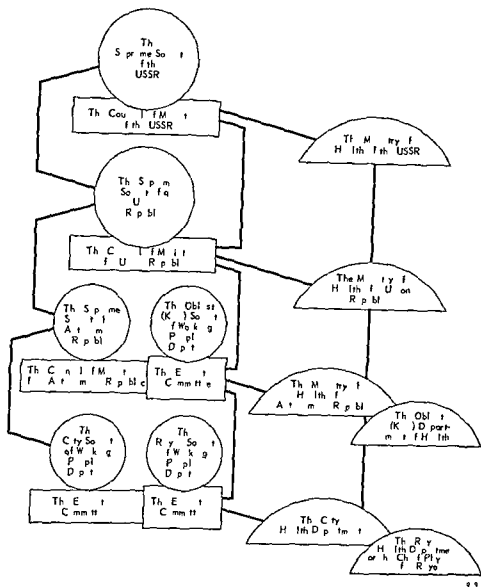
Apart from administrative and finance departments the health services throughout the USSR have three technical departments responsible respectively for adult medicine, maternal and child health and sanitary and epidemiological matters. Soviet medical scientists believe firmly that the child is not just a miniature adult but a different being with different physiological functions requiring a different approach. Paediatrics is therefore not a post graduate specialty of general medicine but a separate study for the undergraduate: the medical student must choose whether he will become a doctor for adults (known as a "therapist") or a paediatrician. He may also elect to become a "hygienist" and receive special training in preventive work. Hygienists staff the sanitary and epidemiological stations. They specialize in such subjects as epidemiology, municipal hygiene or industrial hygiene and fill posts usually occupied by sanitary engineers in other countries. All heads of health divisions or departments in the USSR are medical graduates and all administrative work connected with health is performed by clinicians and specialists on a part time or temporary basis.

Medical care in urban areas

The municipal or "rayon" hospitals each serve a population of 70 000-150 000 and not only have in-patient and out-patient facilities similar to those of other countries but are responsible as well for curative and preventive services in the areas they serve. Their directors are the chief health officers in the rayons and each has under him a specialist in epidemiology and sanitation (with the rank of deputy director), a general district out-patient service staffed by district doctors and nurses, a special screening system

¹ World Health Organization (1960) *Health Services in the USSR* (Publications P P N 3), Geneva.

FIG 1 THE ADMINISTRATIVE FRAMEWORK OF THE HEALTH SERVICES IN THE USSR

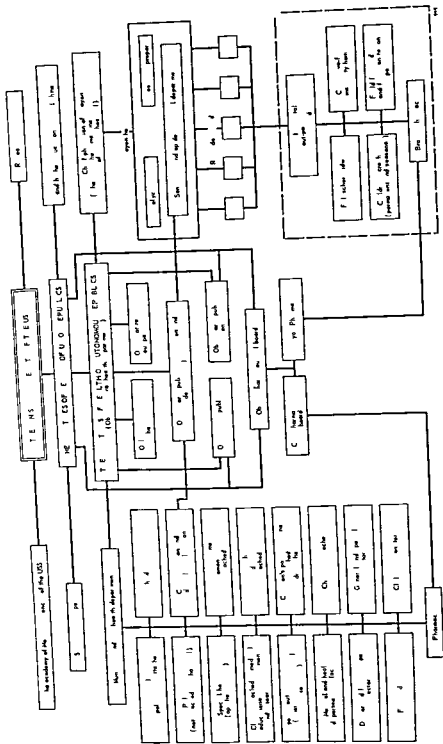


for such groups of the population as children pregnant women and industrial or agricultural workers and a follow up system for known or suspected cases of certain diseases. Patients may be referred to central institutes which have special laboratories, provide consultant services to the rayon hospitals and promote and carry out research.

The rayon is divided into medical districts of some 3000-4000 inhabitants each under a doctor and a nurse who do not confine their activities to treatment but also look after sanitary and hygienic conditions assisted

by the staff of the sanitary and epidemiological station of the rayon hospital. The functions of the district doctors are on the whole wider than those of general practitioners elsewhere: they detect disease at an early stage, control foci of infection, supervise immunization, promote environmental sanitation, treat the sick, arrange hospitalization when required, organize auxiliary voluntary aid and carry out health education programmes. They are based on the rayon hospital, outpatient department and work in hospital as well as outside.

FIG. 2 STRUCTURE OF THE HEALTH SERVICES IN THE USSR



Medical care in rural areas

Medical care in rural areas is also based on integrated hospital and outside services (Fig 3). As the rural areas are often sparsely populated and the distance from the base hospital is a problem they have two additional units not found in urban areas: the district hospital and the feldscher unit (a feldscher is a medical auxiliary of limited responsibilities trained in a special school). A district hospital is usually a 25-30 bed unit serving a number of villages and has out-patient services. Districts with out hospitals have out-patient clinics each staffed by a doctor and a feldscher.

In addition to the hospitals and out-patient clinics every village and farming area has a feldscher post which may be either a feldscher unit or a feldscher midwife post; the type depending on the distance from the district hospital and maternity home. The feldscher midwife post is provided with 2-5 maternity beds and a labour room. Both kinds of unit are under the direct supervision of the district doctor.

Medical care in industry

Nearly all large industrial concerns have their own medical units each consisting of a hospital, an out-patient department and a number of first aid posts. The structure of a typical medical and health welfare department in a factory is shown in Fig 4. Smaller establishments use the rayon or district hospitals.

Maternal and child health

Special importance is attached to the maternal and child health services which are carefully organized to cover preventive, clinical, educational, social, legal and environmental aspects. Mothers are trained in the details of child care at polyclinics, there being at present five separate courses relating to different age groups of children. Maternity leave to the extent of 56 days before and 56 after the birth of the child must be granted; the post-partum period may even

be extended to 70 days or more if necessary for the mother's health. Nursing mothers are entitled to an additional period of absence of 3 months if they so desire without thereby losing any of the privileges attached to their work. Neither expectant nor nursing mothers can be compelled to give up work unless it is absolutely necessary for reasons of health.

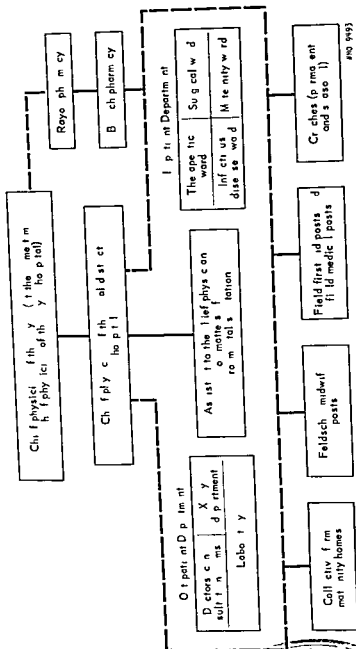
In many areas of the USSR all expectant and recently delivered mothers receive full antenatal and post-natal care. The general policy is that as many deliveries as possible should take place in hospital and this goal has been largely achieved: in urban areas in 1957 for example 100% of deliveries took place in institutions; in rural areas 80%. In that year the maternal death rate was 5 per 10 000 births. Deliveries in urban areas are carried out only by doctors but in some rural areas trained midwives take the place of the doctors.

Health education is an important part of the expectant mother's preparation and she is not only instructed in appropriate exercises but also in painless childbirth. Abortion has again been legalized for social and economic as well as for health reasons although it is not encouraged. No stigma is attached to unmarried mothers.

Paediatricians are available everywhere and supervise the child's progress from the cradle to the age of 16, doing home visits or providing preventive health education and curative services at every polyclinic. Even the smallest hospital units in the USSR have paediatric wards. It is general policy that every Soviet child must be vaccinated against smallpox and tuberculosis and he is usually also immunized against diphtheria and pertussis. Immunization against other diseases depends on local conditions and also on advances in knowledge: vaccination against poliomyelitis has thus recently been introduced.

Permanent creches are provided for children up to the age of 3 years. In some areas as many as 15% of children in this age group attend them; some indeed stay in them all the time except at week ends when their parents take them home. There are also

FIG 3 STRUCTURE OF A RURAL MEDICAL DISTRICT



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Medical care in rural areas

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Special follow up treatment is an important feature of the control of disease in the USSR. Syphilis and the venereal diseases are always followed up in special clinics and out patient departments and in the event of an outbreak of malaria brucellosis trachoma or some other such disease a similar follow up system may be instituted.

A result of these measures and of compulsory notification for certain diseases is that for years there has been no case of such major communicable diseases as plague cholera relapsing fever typhus or dracunculosis. Trachoma typhoid fever leprosy and malaria occur only sporadically or in isolated outbreaks. And the morbidity rates for tuberculosis cerebrospinal meningitis and the venereal diseases have greatly declined. Helminthiasis remains an important problem, ascariasis still being widespread and hookworm occurring in some mining areas.

Non-communicable diseases

As in the USA and in most European countries the two principal causes of death in the USSR are cardiovascular disease and cancer. Rheumatic fever receives much attention in the USSR: every polyclinic has a rheumatic fever department concerned mainly with prophylaxis and treatment; every case is registered; a special ward in Moscow is maintained for research into this disease; alone all children are routinely screened; suspects being given prophylactic treatment; and active cases are not only hospitalized but are also intensively followed up when allowed home.

Prophylactic screening of the whole population for cancer has become a routine measure in the USSR: some of the people being examined at work, the others in special centres. There are 94 oncological clinics and dispensaries; their work is co-ordinated by the Herzen Oncological Research Institute at Moscow, an experimental and clinical institute with 250 beds, a laboratory and many facilities for the study of cancer. Two institutes under the Academy of Medical Sciences carry out pure research in the field of cancer. All cases of cancer are compul-

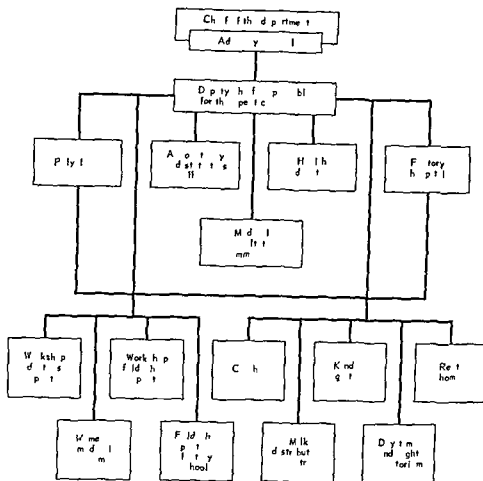
sorily notifiable. The statistics show that cancer of the stomach is far and away the commonest cancer, being twice as common as cancer of the uterus and cervix; the next in frequency of occurrence.

Occupational health and diseases receive much attention as befits a country in which the pace of industrial expansion is so great that industrial workers with their dependants amount to some 60% of the total population. There are 12 institutes of industrial hygiene and occupational diseases. These institutes help in the formulation of codes, rules and regulations for the protection of the workers' health; study industrial processes so as to devise new methods to safeguard their health; even more effectively act in a consultative capacity with regard to the diagnosis and treatment of occupational diseases; and engage in experimental and research work. The health units in large industrial establishments are usually of the type indicated in Fig. 4. They provide comprehensive medical care for the employees and sometimes for their families. Periodic physical examinations are carried out. Health education is given to the workers. Physiotherapy and physical medicine are practised on an extensive scale. Safety arrangements and first aid are highly organized. And workers requiring medical supervision are accommodated in day and night sanatoria called "prophylactoria", staying in these during their free time but carrying on with their ordinary work. Every worker is entitled to four months' sick leave with full pay every year.

Sanatoria, rest homes and health resorts

Sanatoria (which are institutions for the treatment and prevention of all kinds of diseases as well as tuberculosis) rest homes and health resorts have always been popular in the USSR. In 1955 there were 284,000 beds in sanatoria and 160,000 in rest homes. This would allow approximately one out of every 60 Soviet citizens to spend a month every year in a sanatorium. The authorities hope to be able to provide enough beds to enable 50% of the population to spend one month each year in one or other of these institutions.

FIG 4 STRUCTURE OF A FACTORY MEDICAL AND SANITATION DEPARTMENT



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seasonal crèches with beds and a third of all beds in the sanatoria are reserved for children

Research is constantly being carried out in the USSR on the physiology of pregnancy, embryonic and foetal development, the problems of the perinatal period and the environmental factors which affect mother and child. Special institutes study the methodology of obstetric and paediatric practice.

Communicable diseases

The sanitary and epidemiological services are under a state sanitary inspectorate with ramifications through regional and district departments and the network of sanitary and

epidemiological stations down to the police (who carry out routine inspections) and to voluntary workers like those of the Red Cross and Red Crescent. The state sanitary inspectors and experts are virtually independent, their directives being mandatory unless repealed by their superiors. There are more than 5000 sanitary and epidemiological stations which deal with environmental sanitation in all its aspects (even the hygienic quality of children's toys), the prevention, limitation of spread, suppression and treatment of communicable diseases (including immunization and health education) and the organization of the sanitary and epidemiological work of the police and voluntary helpers.

All the central research institutes are equipped with laboratories for elaborate investigations. Elsewhere the equipment is less complete but even the sanitary and epidemiological stations have laboratory facilities for public health and epidemiological investigations.

The chemical industry of the USSR produces almost every type of drug required for medical purposes.

Health education occupies an important place in the Soviet system of medicine and is one of the responsibilities of every doctor and of paramedical personnel. There is a health education division in the Ministry of Health under a chief inspector for health education and a central research institute with additional training and supervisory functions. The republics have similar organizations. Locally the work is done by health education centres (of which there are 354 in the Union) and where there are no centres by the sanitary and epidemiological stations. Special health educators are attached to the staff of the more important institutions, the central research institute being in charge of their training. Health education is given to all age groups and the doctors attached to polyclinics are expected to devote at least 30 minutes every day to it during their domiciliary visits. Feldschers are responsible for health education in those areas where there are no doctors. Voluntary organizations play a leading part in educating the public and every form of communication—posters, pamphlets, films, newspapers, television, radio—is extensively used.

Mental health does not appear to be so great a problem in the USSR as to warrant any special measures not familiar in other countries and there are no special departments or divisions of mental health in the ministries of health. Psychiatric colonies for chronic cases have been set up on the outskirts of large towns and in rural areas and many of the patients are employed under supervision by industrial enterprises and in agriculture. A method sometimes used though not on a large scale is to place mental patients with families. The usual mental hospitals exist and there is an all Union Institute of Psychiatry in Moscow.

The psychoses and alcoholism appear to be the chief mental disorders encountered in the USSR. The neuroses and the psychoneuroses are practically unknown, this being attributed by the authorities to the absence of unemployment in the country and the sheltered life led by the people. The introduction of penicillin for syphilis has reduced the incidence of luetic mental disease to a very low ebb. The number of beds for mental cases throughout the country is small and the authorities do not think that many more are required. This is a very different situation from that obtaining in other countries.

Vital and health statistics are the responsibility of a special division in the Ministry of Health and the republics have their own medical statistical departments with research bureaux attached. Medical students are trained in statistics and short refresher courses are compulsory for all workers in the subject.

Research problem in air pollution

Where exposure to unusual accumulations of higher concentrations of irritant pollutants cause adverse health effects, long continued exposure to lower concentrations of the same or similar materials may not necessarily be harmful. In fact, adverse health effects from such exposure have not been proved epidemiologically except in a few isolated studies. However, rational medical and epidemiological concepts lead to the belief that this matter must be studied on a large scale in many selected places before definite conclusions can be reached.

From the fifth report of the WHO Expert Committee on Environmental Sanitation (W.H.A. Org. No. R. Ser. 1958. 157. 11)

No less than 10 scientific institutes carry out research into sanatorium and health resort therapy the conditions investigated (and treated) ranging from cardiovascular and gastro intestinal diseases to diseases of the female genital tract There are chairs of balneology in the medical schools and special graduate and post graduate courses for workers in sanatoria and health resorts More than 15 000 doctors and 35 000 medical auxiliary workers are employed in these sanatoria and health resorts with one doctor on an average to every 50 sanatorium beds

The sanatoria are usually well situated in the mountains or forest or by the shores of a lake or the sea Special forms of treatment include hydro aero ionization for hypertension an elaborate balneological treatment for gynaecological and digestive disorders and the ubiquitous inhalatoria

Medical and paramedical training

To cope with this immense and complicated medical system the medical schools have been growing in numbers and size and producing an increasing number of graduates These schools were under the Ministry of Education till 1930 but since then they have been placed under the Ministry of Health and medical education is not as it is in so many countries a concern of the universities The curriculum as elsewhere is extensive and varied Only about a third of the applicants are accepted the basis for admission being a qualifying examination Feldschers and nurses with experience are encouraged to apply and if they qualify satisfactorily in the entrance examination are given preference The number of entrants each year is regulated according to statistics of the increase in population the number of retiring medical officers the needs of institutions etc

Outstanding students on qualifying go on as a rule to research and teaching institutes The others usually go to peripheral health units for a period of 3 years this period is compulsory and a special board makes the postings Account may or may not be taken of the graduate's expressed preference for a posting

Eleven separate institutes as well as most of the chief institutions of the Academy of Medical Sciences cater for post graduate education There is a Central Institute for Post Graduate Study in Moscow and similar institutes in many of the larger cities of the republics Graduates who wish to acquire the degree of Candidate of Medical Sciences are not admitted to post graduate institutions until 3 years after graduation and then only if they pass another examination They must then do 3 years of study under supervision and write and defend a thesis before they can be granted the degree A still higher qualification is that of Doctor of Medical Sciences

Special schools staffed by medical graduates train paramedical personnel—the nurses, field scholars, midwives, technicians and the like All theory is taught by these medical graduates but some of the practical training is given by senior paramedical personnel

Other aspects of the health services of the USSR

Research receives special attention The Ministry of Health of the USSR contains two bodies which deal with all technical and scientific problems the Scientific Medical Council and the Academy of Medical Sciences Of these the former keeps abreast of advances in medicine and advises the Ministry on their suitability for general adoption it also furnishes advice to the scientific medical councils of the republics The latter co-ordinates and supervises medical research in the whole Union working in close co-operation with the Scientific Medical Council The Academy contains three departments of clinical medicine, medical biology and epidemiology and hygiene which control 27 central institutes of research As well as these there are institutes under the Ministry of Public Health under the ministries of health of the various republics and under the departments of health of the cities, regions and districts all of which engage in research Planning of research is done centrally and one notable feature is the emphasis placed on the study of experimental pathology and of the physiology of the higher nervous system

in the environment. Amendments published in 1958 did not materially change the occupational dose recommended but stressed the desirability of lower maximum permissible doses for long term work and for population groups other than those controlled by radiation protection officers.

In 1957 the Commission presented recommendations to the United Nations Scientific Committee on the Effects of Atomic Radiation regarding the doses to different parts of the body (particularly the gonads) received by individuals and by large population groups through the use in medicine of ionizing radiation and regarding methods of determining relevant dose values. It revised these recommendations also in 1958.

The International Commission on Radiological Protection functions under the auspices of the International Congresses of Radiology its main objective being to make recommendations on radiation protection standards. It must therefore keep itself in touch with advances in the whole field of radiation protection. Its chairman and members are chosen on the basis of their recognized activities in radiology, radiation protection, physics, biology, genetics, biochemistry and biophysics without regard to nationality. It has five committees at present which deal with such subjects as the maximum permissible dose for external and for internal radiation, protection against X rays up to energies of 3 MeV and beta and gamma rays from sealed sources, protection against electromagnetic radiation above 3 MeV and electrons, neutrons and protons, the handling of radioactive isotopes and the disposal of radioactive waste. Some of these are subjects with which WHO is itself concerned: the Joint WHO/FAO Expert Committee on Methods of Radiochemical Analysis for example drew heavily on the work of the Commission.¹

Knowledge of the harmful effects of radiation is generally thought to be remarkably incomplete and so it is. The effects of chemicals used in industry, however, and of the gases, smoke and dust released into the atmosphere are little if any better known.

But radiation effects are cumulative and delayed. They may not be recognized as due to radiation because they are not specific. They cause genetic changes supposed at present to be proportionate to the dose received and unrelated to the distribution in time of the irradiation. Although ionizing radiation can only be detected with special instruments which often do not give the true maximum exposure of the relevant part of the body, there is nevertheless sufficient evidence that its harmful effects are greater than those of any other agent known to be injurious to the health.

The Commission's task of establishing sound maximum permissible levels of radiation is not an easy one since knowledge of the effects of small doses and dose rates of ionizing radiation is so scanty. But the establishment of levels is essential otherwise no advice on adequate protective measures can be given. This is the same situation as with other agents injurious to health: in most cases it is impossible to fix figures indicating the risks of harmful effects at different levels of exposure or to state with any degree of certainty a quantity below which any hazard is excluded. The Commission's method of fixing maximum permissible levels of radiation is to bring together people who have extensive knowledge and experience of the relevant biological effects and people who know the working conditions and possibilities of protection: in other words, people who can discuss the problem from every aspect.

In recent years the problem has become more complicated. The maximum permissible levels were formerly applied chiefly to persons exposed by their occupation to radiation; now the Commission is also concerned with the dose outside the area under the supervision of a radiation protection officer and with the dose for the whole population. Other differentiations will probably become necessary: there may have to be different maximum permissible doses for an increased number of organs in the body and for the various kinds of population groups exposed, especially in regard to age and sex.

RADIATION PROTECTION INTERNATIONAL COLLABORATION

WHO following in the steps of the United Nations made a provision in its Constitution for consultation and co operation with non governmental organizations recognizing in this way the experience knowledge and use fulness of these bodies and the help they could give it in its work For admission to what is called official relationship with WHO a non governmental organization must be concerned with matters within WHO's competence and pursue aims and purposes in conformity with the spirit purposes and principles of WHO's Constitution It must be of recognized standing and representative of its particular field It must have a directing body and authority to speak for its members through its authorized representatives Admission to official relationship is not granted lightly but only after a careful scrutiny of the application by the Executive Board and the question of maintenance or termination of the relationship is periodically reviewed

When a non governmental organization is admitted to official relationship it becomes entitled to appoint an observer to participate without right of vote in certain WHO meetings and on the invitation of the chairman to address a meeting It is given access to non confidential documents and to such others as the Director General may in his discretion allow It is entitled to submit memoranda to the Director General although the latter has the right to decide to what extent he will circulate them

More than forty non governmental organizations are at present in official relationship with WHO One of these of much topical interest is the International Commission on Radiological Protection An international protection organization in this field has existed since 1928 its main task before the Second World War being to recommend suitable safety measures for the use of X rays and radium in medicine X rays had been in use since their discovery in 1895 and their dangerous effects had become known within

a very short time beginning with the most obvious their effects on the skin (dermatitis swelling necrosis) and on the conjunctiva The first case of cancer attributed to X rays was recorded in 1902 the first death from such a cancer in 1914 Constitutional effects were noted almost as early as the effects on the skin As the gamma rays of radium are more penetrating than X rays an added hazard from undue exposure to it is aplastic anaemia Many casualties resulted from the use of X rays and radium in the early years after their introduction and the establishment of an international organization in 1928 to help bring some measure of standardization into the methods used to protect those who worked with them was by no means premature

The Second World War brought the increased use of radionuclides and nuclear energy which meant that the danger of exposure to ionizing radiation hitherto small and limited mainly to the field of medicine was much enhanced Radioactive isotopes essentially by products of work on nuclear energy are daily growing in importance in biology medicine and industry and in time much of industry may depend on nuclear power The dangers of radiation are thus becoming more widespread and threaten not only those who work with radioactive substances but also those who come into contact with radioactive wastes and the radioactive fall out of atomic bombs The need for efficient safety measures to prevent the somatic and genetic effects of radiation is evident

At the Sixth International Congress of Radiology in London in 1950 the former protection organization was transformed into the International Commission on Radiological Protection and the scope of its work and the number of its members were greatly increased In 1953 it produced its recommendations on the maximum permissible levels of radioactivity in the human body and

HEALTH AND MORBIDITY IN THE SEYCHELLES

In 1953 the Government of the Seychelles asked for WHO's help in reducing the incidence of intestinal parasitic diseases in the islands. Although a population census had been taken in 1947 and registration of births and deaths was by then compulsory no information was available on the general nutritional condition and health of the people on the prevalence of diseases due to malnutrition or on general morbidity.

It was therefore decided to make a general survey of health conditions in the islands and especially of dental and nutritional status, incidence of intestinal diseases and other easily diagnosed conditions, growth and weight curves for children up to the age of 16, haemoglobin levels and erythrocyte sedimentation rates and the relationship of these factors with one another and with general living and sanitary conditions such as housing, overcrowding, social status and latrine arrangements, relationship between soil and water pollution and incidence of amoebiasis and helminthiasis and finally incidence of the sickle cell trait, eosinophilia and positive serological reactions in the Chediak syphilis test.

The result of the survey made in 1956-1957 are described in a paper by Dr A. J. W. Spitz¹ which will shortly be published in the *Bulletin of the World Health Organization* and which is summarized below.

Characteristics of the country

The Seychelles are a group of 92 islands (of which only 40 are inhabited) in the Indian Ocean, situated between latitudes 4° and 10° South and about 1000 nautical miles from the coast of Africa. Their combined area is 405 km² and in 1956 the population numbered 40 000. The climate is damp particularly along the coasts and is influenced by

the trade winds. Temperatures vary between 68° and 88° F.

When the French took possession of the islands in 1756 there was no indigenous population. However the settlers soon imported slaves from Africa and most of the present inhabitants are descended from them. Indian and Chinese merchants arrived in the nineteenth and twentieth centuries and most of the islands' commerce and trade is now in their hands.

Socially the inhabitants are composed of a small minority of so-called "big planters" and a vast majority of poor labourers. There is a small middle class consisting of civil servants, a few artisans and small land owners. Apart from Victoria the capital there are hardly any urban areas and each house is practically speaking a self-contained unit.

The principal occupations and sources of income are the growing of coconut palms and the production of copra and—on a smaller scale—cinnamon oil, quills, vanilla and patchouli. Rice and fish are the staple foods.

Malaria, leishmaniasis, yellow fever, sleeping sickness, yaws and bilharziasis are unknown in the islands. In 1957 there were 50 cases of leprosy and 100 of tuberculosis. There are epidemic and sporadic outbreaks of whooping-cough, diphtheria, measles, chicken pox and influenza. At one time the venereal diseases were of major concern but they are now in recession. Intestinal diseases are the chief public health problem, in particular the helminthiasis and various types of protozoal infection (amoebic dysentery, giardiasis and balantidiasis).

Organization and scope of the survey

The scope of the survey was limited by the personnel and laboratory material available. The field work was done mainly by a physician and a laboratory technician. The first was responsible for organization and direction of

¹ Publ. Hlth Admin. of WHO Regional Office for Africa, Brazzaville, Rep. pub. of the Congo. Formerly Senior Medical Officer, WHO T. Am., Seychelles.

Another non governmental agency in official relationship with WHO is the International Commission on Radiological Units and Measurements (ICRU) established in 1925 under the auspices of the First International Congress on Radiology. It originally consisted of two members from each of the fifty countries taking part in the International Congresses on Radiology and its aim was to establish internationally acceptable units of radiation dosage. In 1928 it adopted the definition of X ray dosage known as the roentgen which made it possible for the first time to measure radiation in all countries in terms of the same unit. The ICRU was completely reorganized after the war and its membership reduced to twelve persons in all selected for recognized technical ability without regard to nationality. In 1953 at its seventh meeting a new basic unit for the measurement of radiation dosage—the rad—was introduced. The ICRU entered into official relationship with WHO in 1956 and is now recognized by WHO as its body of technical advisers in the field of radiological units and measurements.

Increased knowledge of the effects of ionizing radiation on man is obviously needed. Much research has been carried out into this subject in the recent past but progress is slow compared with the speed with which man made sources of ionizing radiations proliferate and are likely to proliferate in the next few decades. Research to be effective

must be international and here there is scope for WHO with its increased interest in all aspects of research. WHO proposes to carry out co-ordinated investigations in several countries into groups of people receiving radiotherapy so as to determine the incidence of radiation disease for the number of patients in any one hospital or institution or in any one country is insufficient for a proper study. It also proposes a study on an international scale of patients receiving thorotrast in order to obtain data on the long term effects of small doses of ionizing radiation. Recent developments in dosimetry enable fairly reliable determinations of radiation doses received from thorium dioxide to be made. These can be correlated with the radiation effects induced in the patients and thus provide a basis for the quantitative assessment of the health hazards of low level radiation exposure. Other inquiries WHO proposes to make are into the incidence and nature of genetic defects, the effects on the population in those parts of the world known to be exposed to high natural radiation² and the effects on the foetus of low doses of radiation received at various stages of development. Only by systematic research closely co-ordinated internationally can the knowledge be acquired which will make it possible to safeguard the human race effectively from the harmful effects of ionizing radiations.

See p. 8, 121

"La fin des asiles"

Under this title Herve Bazin, the well known French writer, has recently published a survey of mental hospitals in ten European countries. Written at the request of WHO, this publication* shows the immense advances that have been made in the treatment of the mentally ill and how psychiatry has ceased to be a science of despair to become—in thirty years—one of the most humane and active branches of medicine. It describes the advent of the open door hospital and outpatient psychiatric services, reviews the mental disorders of childhood and old age and deals at some length with the question of alcoholism—the cause or effect of a very high proportion of cases of mental disorder. After discussing the various bodies which seek to prevent personal, family and social conflicts (family and marriage guidance councils, institutes of human relations, industrial psychiatric services, etc.) Mr Bazin concludes his survey by stressing the fact that mental health is based primarily on the attitude of the individual and on his effort to understand others.

age about the same level as in infancy. This does not tally with the increasing frequency of ankylostomiasis as age advances nor with the data on nutritional disorders and malnutrition. The rate of erythrocyte sedimentation is relatively high in the 1-4 and 5-9 age groups.

Dental health

The dental condition of the population varied considerably from one zone to another. One remarkable finding was that the inhabitants of West Mahe, who have the worst living conditions and the highest rates of malnutrition and intestinal parasitism, had better teeth than the other islanders.

Environmental sanitation and social status

The survey showed that only 45% of the population enjoyed good social conditions and that three-quarters of them lived in definitely bad conditions. Of the houses 16% could be considered as "good", 27% as "fair" and the rest as "bad". 12.5% of the inhabitants had a living space of 45 m² or more per person; 25.6% had 23-44 m² and 61.9% had less than 23 m². Of the latrines 16.7% were "good", 27.2% "medium" and 56.1% "bad".

Presence of intestinal parasites

Of the stools examined 93.3% contained parasites, the age group distribution being as follows: under one year 21.8%, 1-9 years 95.3%, 10-19 years 97%, 20-39 years 95.7%, 40-59 years 93%, over 60 years 97.8%. The multiple infection index (average number of different parasites per infected person) was 2.6. Trichuriasis and ascariasis reach their peak in the 5-9 age group but while ascariasis then drops steeply from 78.4% to 43.4% in old age, trichuriasis, although declining slightly, remains at 86% in old age. Ankylostomiasis increases steadily from childhood to old age (18.7/35.3%). Strongyloidiasis follows a very similar curve,

although its incidence is considerably less with a decrease after the 40-59 age group.

Incidence of amoebiasis (*Histolytica*) tends to increase with age and giardiasis reaches its maximum incidence in the 1-4 age-group after which it gradually decreases with age. There is no marked difference in the parasite rate as between males and females.

The soil samples taken near the houses showed that 23.5% of the inhabitants were living in areas where the soil was contaminated with intestinal parasites. The ground near 984 houses was examined from this point of view with the following results: roundworm eggs were found in 133 soil samples, whipworm eggs in 42, *Strongyloides* larvae in 50 and hookworm larvae in 7. This made a total of 232 houses with polluted soil. In this connexion it was found that the cause of the high degree of soil pollution was the widespread use of chamber pots; for although these vessels are emptied into the latrine, they are washed out near the house and the swillings are poured into the yard.

Other pathological conditions

Incidence of diarrhoea was found to be highest in the 5-9 age group. This group was also the most affected by asthma, which appears to indicate some relationship between this disorder and helminthiasis, seeing that the same group shows the highest incidence of ascariasis and the highest index for multiple intestinal parasite infection. Pathological conditions of the heart appear to increase with age, which is not surprising. Pulmonary diseases reach one peak in the 5-9 age group and another in old age. There is a steady increase in mycotic infections of the skin from 0.9% among infants to 18.7% in the 20-39 age group. In the lowest age groups there is high incidence of hernia (mainly umbilical hernia) and of pathological conditions of the eyes. One noteworthy feature is the frequency of degenerative eye diseases (pterygia and pterygium) in young persons. There appears to be a rather high rate of uterine fibroids (3% among women of 20 years and over).

the work and for administrative matters and the second was required to collect and examine blood stool soil and water specimens. The only auxiliary personnel available were inspectors and local public health nurses who helped only in their respective districts.

It was decided to study a population sample of 5000 6000 people. In the absence of population registers the house was adopted as the sampling unit and one house was sampled out of every seven. All the subjects were examined in their own homes. In all 984 houses were sampled with 5766 inhabitants of whom 5587 were examined. Each surveyee was handed a waxed cardboard container for a stool specimen to be presented on the day of the examination.

The physician noted the following particulars in each case: age height weight nutritional condition signs of malnutrition state of teeth. In the clinical examination all easily diagnosable conditions were recorded and in particular pulmonary and cardiac abnormalities bronchial asthma inflammatory and degenerative conditions of the eyes (follicular conjunctivitis pterygium pinguecula arcus senilis cataract etc.) hernia uterine fibroids diagnosable by abdominal palpation cutaneous and subcutaneous infections mycotic infections of the skin, diarrhoea pregnancy. Note was also taken of the ethnic group to which the subjects belonged of female fertility of social status and of sanitary conditions in the household concerned including overcrowding if any and latrine arrangements.

The laboratory technician made the following examinations: blood (haemoglobin erythrocyte sedimentation rate parasites and eosinophilia sickle cell trait Chediak test) stools (*Entamoeba histolytica* trophozoites and cysts *Giardia lamblia* *Balantidium coli* hookworm eggs and larvae (*Ancylostoma duodenale* and *Necator americanus*) roundworm eggs (*Ascaris lumbricoides*) *Strongyloides stercoralis* larvae whipworm eggs (*Trichuris trichiura*) pus and red blood cells) soil (examined for worms eggs larvae and amoebic cysts) water (the same examinations as for soil samples). No bacteriological investigations were made.

General data

The survey showed that young people predominate in the Seychelles population 52% of the inhabitants being under 20 years of age. In the lower age groups males are more numerous whereas females are more numerous among the adults. The racial distribution is as follows: 20.2% Caucasians (European) 61.1% Africans 3.7% Indians 2% Chinese and 13% ill defined races. The pregnancy rate was found to be 46 per 1000 population. The neonatal mortality rate (under one year) and the infant mortality rate (under five years) were respectively 67 and 90 per 1000 live births in 1956 1957. The miscarriage and stillbirth rate was very high.

Nutritional conditions

The classification of the inhabitants as obese normal thin and emaciated gave the following results: obese 9.1% normal 40.4% thin 41.8% emaciated 8.7%. If the obese and normal are combined into a single well fed group and the thin and emaciated into a single under fed group an almost exact 50/50 balance is obtained. More than 27% of the subjects examined showed signs of malnutrition. The highest percentage of disorders caused by malnutrition was found in the 5-9 age group which was also the group with the highest infection rate. In fact the malnutrition curve was remarkably similar to the ascariasis curve up to the 20-39 age group and to the multiple parasitosis curve at all ages. As a rule the degree of malnutrition was not serious and this may be attributed to the fact that the basic diet (fish and rice) is not seriously lacking in nutritional elements so that it may be concluded that the nutritional disorders are caused by intestinal parasitism.

Haematology

The percentage distribution of haemoglobin levels was as follows: less than 50 0.0 50-59 0.2 60-69 1.4 70-79 15.5 80-89 54.6 90-99 28.1 +100 0.2. The haemoglobin level tends to increase up to the 20-39 age group and then to fall until it reaches in old

group between a country like Venezuela and the United States of America

It is clear that mortality in early infancy is excessive. For children aged from 1 to 4 years diarrhoeal diseases represent the main cause of death in 12 out of 17 countries. In the others the diarrhoeal diseases figure among the five main causes of death. The rates of mortality from typhoid gastritis enteritis etc are very high in many of these countries

In general it appears that a reduction of from 30 / to 60 / in diarrhoeal diseases may be expected if drinking water is supplied in an accessible form and in adequate amounts. The high mortality from these diseases is but one of the many consequences of lack of water supply

Payin_g for water supplies

The installation of water supply systems requires large capital investments and this has given rise to considerable anxiety in the minds of many public health administrators. A proper understanding of means of amortization should however help to overcome their fears. The amount of capital necessary is less important than the annual interest and amortization payments. In many cases these can be met without straining the normal resources of the communities concerned although there is a strong feeling on the part both of the public and of some sanitarians that water should be supplied to all free of charge. However by adopting the principle of complete or almost complete repayment certain communities have shown that the public can be persuaded to accept the obligation of paying for their water. The acceptance of this principle is essential to the success of the programme

At present the revenue of most water supply services in Central and South America hardly ever covers the interest and amortization costs. It is rarely in fact enough to defray the annual cost of maintaining and running the service. Consequently the public health official is confronted with the task of convincing governments and the public that the water supply service must be run on a

commercial basis. People must be persuaded to give up the idea that a merchandise whose production and distribution costs money should be as free as air. When a housewife has to go a considerable distance to buy a small jug of water in the market place it very often costs her ten times more than she would ever have to pay for drinking water piped to her own home. Yet piped water is expected to be supplied free.

Taxes on real estate and revenue from other sources have been used in the Latin American countries to finance the supply systems. However there are very few cases in which this fully covers amortization of the capital as well as maintenance and running costs.

International financial corporations rarely grant large loans for community water supply services. This does not mean that they would not be available under certain conditions i.e. if clear proof is given of the economic soundness of the purposes for which they are intended as well as the existence of a more than reasonable probability of repayment and if it is shown that the maintenance and functioning of the service will be covered by the revenue from suitable charges.

Nevertheless even should such loans be available it is preferable to develop and use local sources of finance on the principle of repayment and self supporting services. It is particularly important to recognize that the extension of water supply services in Latin America must be based on the maximum utilization of local resources in manpower materials and money.

Each of the countries concerned should establish as soon as possible the most suitable type of organization to plan and carry out a national water supply scheme with the available resources and should promulgate the appropriate legislative measures.

Simultaneously an inventory should be made of available water supply services and of communities classified according to size. Priority should be given to the largest communities urgently in need of such services and presenting the fewest obstacles to immediate success. An estimate should be made of the cost of the services in each of the

THE PROBLEM OF WATER SUPPLIES

If public and domestic water supply programmes continue to be carried out in the countries of Latin America at their present rate it will take 50 to 100 years for the needs of about 75 % of the population to be covered. The problem is mainly an economic one and its solution involves finding some way of investing capital profitably in public works of this type. In an article recently published in the Boletín de la Oficina Sanitaria Panamericana¹ and summarized below Dr A. Wolman makes an objective study of the extent of the problem, its repercussions on public health and its possible solution.

The Pan American Sanitary Bureau (PASB) which serves as the WHO Regional Office for the Americas has collected data on the availability of water to the inhabitants of certain countries of Latin America. Despite the inadequate and defective nature of the information available it has been possible to ascertain to what extent the population is without water supply services in a certain number of countries.

Some 182 million people live in the countries covered by the PASB survey. Of these 75 million live in towns with 2000 inhabitants or more. In 1958 39 % of the inhabitants of these urban areas i.e. 29 million persons were without piped water. Towns of 50 000 inhabitants or more had the best services but frequently more than 25 % of the population did not have an adequate and convenient water supply.

Almost 50 % of residents in towns with 10 000 to 50 000 inhabitants and 70 % of residents in towns with 2000 to 10 000 inhabitants are in the same position. In fact some large towns have no piped water supply whatsoever. The situation has been aggravated by the rapid growth of the towns.

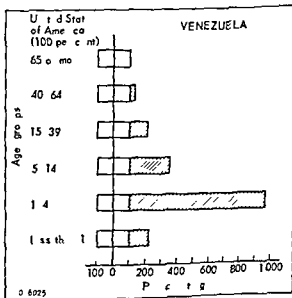
Some 107 million persons not classified as town dwellers live in communities of less than 2000 persons or in rural areas. Of these more than 70 % are without a piped water

supply though many live in communities sufficiently densely populated to require one.

Effects on health

The estimated mortality rates for all ages vary between 15 and 20 per 1000 inhabitants although in the majority of countries surveyed there is no full record of such data. The figure reproduced below clearly shows the great difference in the mortality per age

GENERAL MORTALITY RATES IN VENEZUELA EXPRESSED AS PERCENTAGES OF MORTALITY RATES IN THE UNITED STATES OF AMERICA



¹ B. I. O. S. T. P. A. M. 1959 47: 375. The article was used as a basis for the technical discussion of the problem of the Drinking Council of the Pan American Health Organization (by the 15th session of the WHO Regional Committee for the Americas) held in Washington D. C. 1 September 1959.

Difference

group between a country like Venezuela and the United States of America

It is clear that mortality in early infancy is excessive. For children aged from 1 to 4 years diarrhoeal diseases represent the main cause of death in 12 out of 17 countries. In the others the diarrhoeal diseases figure among the five main causes of death. The rates of mortality from typhoid gastritis enteritis etc. are very high in many of these countries.

In general it appears that a reduction of from 30 / to 60 / in diarrhoeal diseases may be expected if drinking water is supplied in an accessible form and in adequate amounts. The high mortality from these diseases is but one of the many consequences of lack of water supply.

Paying for water supplies

The installation of water supply systems requires large capital investments and this has given rise to considerable anxiety in the minds of many public health administrators. A proper understanding of means of amortization should however help to overcome their fears. The amount of capital necessary is less important than the annual interest and amortization payments. In many cases these can be met without straining the normal resources of the communities concerned although there is a strong feeling on the part both of the public and of some sanitarians that water should be supplied to all free of charge. However by adopting the principle of complete or almost complete repayment certain communities have shown that the public can be persuaded to accept the obligation of paying for their water. The acceptance of this principle is essential to the success of the programme.

At present the revenue of most water supply services in Central and South America hardly ever covers the interest and amortization costs. It is rarely in fact enough to defray the annual cost of maintaining and running the service. Consequently the public health official is confronted with the task of convincing governments and the public that the water supply service must be run on a

commercial basis. People must be persuaded to give up the idea that a merchandise whose production and distribution costs money should be as free as air. When a housewife has to go a considerable distance to buy a small jug of water in the market place it very often costs her ten times more than she would ever have to pay for drinking water piped to her own home. Yet piped water is expected to be supplied free.

Taxes on real estate and revenue from other sources have been used in the Latin American countries to finance the supply systems. However there are very few cases in which this fully covers amortization of the capital as well as maintenance and running costs.

International financial corporations rarely grant large loans for community water supply services. This does not mean that they would not be available under certain conditions i.e. if clear proof is given of the economic soundness of the purposes for which they are intended as well as the existence of a more than reasonable probability of repayment and if it is shown that the maintenance and functioning of the service will be covered by the revenue from suitable charges.

Nevertheless even should such loans be available it is preferable to develop and use local sources of finance on the principle of repayment and self supporting services. It is particularly important to recognize that the extension of water supply services in Latin America must be based on the maximum utilization of local resources in manpower materials and money.

Each of the countries concerned should establish as soon as possible the most suitable type of organization to plan and carry out a national water supply scheme with the available resources and should promulgate the appropriate legislative measures.

Simultaneously an inventory should be made of available water supply services and of communities classified according to size. Priority should be given to the largest communities urgently in need of such services and presenting the fewest obstacles to immediate success. An estimate should be made of the cost of the services in each of the

areas selected and a system of charges prepared that will meet the interest on and repayment of the loans as well as the costs of maintenance and possible extension

It is important to prepare and distribute publications designed to convince the public of the value of the service and the moderate nature of its cost

Attention must be paid to training personnel if continued success is to be ensured

Training of specialized personnel may perhaps be carried on permanently for the towns will increase in size and new problems arise

The important function of giving guidance for the training of officials in the administrative financial and technical aspects of the programme devolves on PASB/WHO and the United States International Cooperation Administration (ICA)

PASB ZONE OFFICE FOR CENTRAL AMERICA *

The system of Zone and Field Offices established some eight years ago by the Pan American Sanitary Bureau (PASB) which acts as the WHO Regional Office for the Americas has proved to be an effective way of achieving close co-operation between PASB and the health authorities of Member States. One of these Offices has been located in Guatemala since 1943—first as an Area Office and later as the Office for Zone III. Its work is described in the article that follows.

The Zone III Office of PASB in Guatemala City collaborates with the governments of Central America including British Honduras and Panama (see map) for the improvement of their health services mainly through the development of local public health services. For this purpose action is started in selected localities which provide training facilities for workers who then serve in other areas when the programme is extended. This eventually leads—as is now the case in El Salvador, Guatemala, Honduras, Panama and British Honduras—to the reorganization of health services at the national level.

The governments of the countries in Zone III continue to give priority to malaria eradication programmes. Of the Zone's 538 570 km² 437 260 km² are considered as malarious and this area contains 6 600 000 inhabitants i.e. 57% of the Zone's total population. By the end of 1958 El Salvador

and Guatemala were in their third year of insecticide spraying. British Honduras had by then completed its second year. Costa Rica and Panama were in their second year and Honduras had completed its first year. Nicaragua started spraying operations in 1958. There have been increases in technical advisory services and in the provision of specialists for malaria work in the different countries. 38 / of the fellowships awarded in the zone in 1958 were for training in various aspects of malaria eradication.

Since 1956 the presence of *Aedes aegypti* has not been recorded in Zone III. Nicaragua, Panama, the Canal Zone and British Honduras have been declared free from the mosquito. By the end of 1958 final verification of the position was completed in Guatemala and was proceeding in El Salvador and Honduras and it was hoped that it would shortly be possible to announce the eradication of *A. aegypti* from those countries.

Tuberculosis control is still receiving special attention in the Zone. Intensive BCG vaccination campaigns were carried out in 1958 in Guatemala and Honduras in the two coun-

Adapted from an article published in PAHO O or (y) 3 No 3 15. An article on activities in Zone I appeared in Ch WHO Wkly Rpt 1958 12 400 and on activities in Zone II in Ch WHO Wkly Rpt 1958 12 304. Information about PASB activities also goes through Mexico-USA relations. It appeared in WHO Chronicle 1959 13 270.

ZONE III (CENTRAL AMERICA)



tries together more than 3 million persons were tuberculin tested and nearly 2 million vaccinated

Oral vaccination against poliomyelitis using attenuated live virus was started experimentally in Nicaragua in 1958. The Office supplied the vaccines and laboratory equipment and gave the necessary technical advice.

In Panama and El Salvador there has been great progress in rural environmental sanitation activities carried out as part of integrated health programmes notably as regards water supplies sewage disposal and the installation of baths and wash basins. In Guatemala and Honduras progress has been made in the organization of sanitation programmes and in the former there have been notable improvements in urban water

supplies. All countries in the Zone are paying special attention to the training of sanitary inspectors and to the provision of adequate supplies of pure water.

The main work in connexion with the zoonoses and with veterinary public health has been the organization of central or local services and the training of specialized and auxiliary personnel in some countries.

The Zone Office has done everything possible to promote the organization of training facilities for public health personnel. In 1958 training courses were provided in El Salvador Guatemala Honduras and Panama and by the end of the year 355 health workers had completed their training including 21 physicians 61 nurses 76 sanitary inspectors and 160 auxiliary nurses. The need for this personnel reflects the development of

the regional and national health services In 1958 20 fellowships were awarded for general public health studies 33 for regular courses in different specialties and 66 for special

courses seminars and study and observation tours The result has been an increase in the proportion of specialized personnel of all grades in the Zone

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958 *

8 Cancer statistical studies

Cancer research is taking place on an impressive scale in a number of countries Many institutions and organizations especially in North America and Europe are investigating the causation prevention and therapy of the disease and all possibly relevant factors Research has been stimulated in turn into the very fabric of life and its processes as revealed in the physiology chemistry and physics of cell growth

The conduct of cancer research is generally costly and complex and so limited to well endowed and highly organized institutions Realizing that WHO could not materially add to the volume of laboratory and clinical research being carried out in this field even if it devoted a large share of its budget to such work the Interim Commission and later the First World Health Assembly decided to concentrate on cancer statistics where WHO's position as an international organization could be made use of in the standardization of the nomenclature and classification of tumours and in the development of ways of assessing incidence and prevalence

Following a suggestion made by the WHO Expert Committee on Health Statistics in 1949¹ the Second World Health Assembly established a Subcommittee on the Registration of Cases of Cancer as well as their Statistical Presentation Meeting in March 1950 this Subcommittee discussed the difficulties of defining cancer in terms of the International Classification of Diseases Injuries and Causes of Death of tabulating

multiple causes of death where cancer was one and of obtaining an accurate diagnosis of the disease National committees on vital and health statistics should the Subcommittee felt be encouraged to sponsor the study of these problems and also geographical variations in mortality from cancer of specific anatomical sites as well as to determine the total incidence of cancer in populations of sample areas over selected periods and where feasible to institute a follow up system so as to arrive at a true survival rate In the absence of any agreed method of calculating survival and apparent recovery (cure) rates the Subcommittee made certain recommendations and proposed certain definitions and rules that were designed to produce standard returns

Another Subcommittee on the Registration of Cases of Cancer met in September 1951² and after discussion of the general principles that should govern the statistical classification of neoplasms agreed that such a classification should distinguish between the anatomical site the histological type and the degree of malignancy To provide adequate flexibility and ease in coding a separate classification in respect of each of these three aspects was required The Subcommittee accordingly drew up a classification of neoplasms according to anatomical location for general use in cancer registration and morbidity statistics This classification was based upon the International Classification of Diseases Injuries and Causes of Death but contained modifications to provide for a strictly anatomical classification where grouping on a histological basis was found in the International Classification

¹ The articles of the agreement of WHO with the I.C.D. 1959 13
on health statistics approved by WHO in 1949 66

Wld Hlth Org t h R p S 1950 5

Wld Hlth Org t h R p S 1950 25 17

Wld Hlth Org t h R p S 1954, 53 43

The Subcommittee did not embark upon any classification of cancer according to histological type or degree of malignancy. In the former case there was lack of uniformity in histological terminology and in the latter there was considerable disagreement concerning the concept of pre-malignancy. Nevertheless the American Cancer Society's *Manual of Tumor Nomenclature and Coding*⁴ which the Subcommittee regarded as the first serious attempt to prepare a histological code for statistical studies was recognized as an important advance towards the development of a standard histological classification of neoplasms. The Subcommittee therefore recommended that it be distributed to national organizations for study and if possible for trial with or without modifications. Their experience in its use and their views on its applicability would materially assist WHO in its preparation of a standard classification according to histological type and to degree of malignancy.

Various international and national organizations had made attempts to classify cancer according to stage. The Subcommittee reviewed their work and briefly outlined the principles that should govern any such classification. While recommending the system for staging of cervical cancer adopted at the International and Fourth American Congress on Obstetrics and Gynecology it expressed the view that any future revision of that system should bring it into conformity with those principles.

In 1956 the Expert Committee on Health Statistics returned to the subject of classification of neoplasms by site, histological type and stage. It recommended that WHO expand the publication of statistical studies on the various types of cancer, increase the distribution of information on the statistical methodology applicable in the field and continue its efforts to improve the classification of cancer in co-operation with the appropriate professional organizations. In order to assess the results of treatment the maintenance of cancer registers was essential. WHO

should therefore keep the different systems and methods of cancer registration constantly under review so as to ascertain how that could best be done. Since a Subcommittee on Cancer Statistics had last met a number of cancer registers had been set up throughout the world. International co-operation under the auspices of the International Union against Cancer had been achieved in the compilation of a statistical code of neoplasms classified histologically. Progress had been made in the classification of cancer according to degree of malignancy. Various techniques had been developed for the assessment of the incidence and prevalence of cancer. And more statistical studies on the etiology of cancer were being carried out.

A Sub-Committee on Cancer Statistics met in December 1957.⁵ It had before it a resolution of the Tenth World Health Assembly on the epidemiology of cancer which requested the Director General of WHO to pursue the collection and publication of the relevant mortality and morbidity statistics to continue to seek acceptable international definitions and an agreed statistical classification to provide a centre to give advice on the objectives and methods of cancer registration and to consider the desirability and urgency of co-ordinating and expanding work on cancer epidemiology and statistics in order to contribute more effectively to national needs through improved international liaison.

The Sub-Committee agreed to define "incidence" as the number of new cases occurring during a stated period of time in a given population and "prevalence" as the number of cases current in a given population either at a given point of time—e.g. on a given day (point prevalence)—or during a stated period (period prevalence). The statistical unit should be indicated either "persons" diagnosed as having cancer regardless of whether they have more than one primary cancer or "cases" in which each primary site is counted separately. The proportionate distribution of cancer, i.e. the relation of different forms to the total number of cancer cases is occasionally useful particularly when

⁴ American Cancer Society (1951) *Manual of tumor nomenclature and coding*. N. Y. K.

⁵ W.H.I.A. Org. *Rechn. R. p.* Ser. 1957 133 14.

W.H.I.A. Org. *Int. R.* Ser. 1959 164 27.

Off. R. W.H.I.A. Org. 1957 79 6 (W.H.A.10 18).

no population denominator is available and often too as a supplement to rates based on populations

The Sub Committee discussed the value of *statistics of incidence and prevalence in the organization of medical care in cancer control and in epidemiological research* Mortality statistics cannot provide differential survival rates for the various kinds of cancer but are nevertheless a useful source of information. Compulsory notification on the pattern of that for communicable diseases has the disadvantage that the minimum amount of useful information required about each cancer case is considerably more than that normally obtained about a communicable disease but it does provide information which because of its confidential nature might not otherwise be obtainable. National cancer registration could only be effective in small countries in large ones it is doubtful whether the amount of work needed to keep track of all cases is justifiable merely to obtain incidence and prevalence statistics. Surveys of the *ad hoc* type carried out in the United States and in France or as a by product of general morbidity surveys are a distinct possibility. Other sources such as social security statistics records of absenteeism and general practitioners records are usually inadequate. On the whole the Sub Committee concluded any investigation not specifically adapted to cancer does not supply the information required.

Linked with the difficulty of obtaining reliable statistics is the question of when cancer actually starts. In most morbidity studies a case of cancer dates from its first diagnosis but this is not wholly satisfactory from the standpoint of statistics of incidence. The Sub Committee accordingly recommended that countries recording the date of onset of the first symptoms in their registrations should carry out experimental studies to determine whether the adoption of the onset of symptoms as the starting point of the disease would offer any advantage in such statistics.

Unusual incidence taken with dietary and other habits and environmental conditions in under developed communities might shed

light on the etiology of malignant neoplasms. In such regions therefore joint schemes of cancer diagnosis and of registration of population and vital statistics might be established in selected areas.

The Sub Committee then discussed cancer registration as a system of maintaining a centralized register covering patients from a whole country state or other well defined large area. This system has begun to be instituted widely throughout the world as a means of providing valuable statistical information on cancer. A cancer register affords a means of assessing the results of treatment comparing the effectiveness of various forms of treatment computing rates of survival studying the etiological and pathogenetic aspects of cancer and indicating methods of control and medical care. There are several ways of starting a register depending on the purpose it is meant to fulfil. Points that deserve note either in starting or in maintaining such a register are its scope the anatomical sites to be covered the sources of the data the items of information to be collected who should be in charge of the register how the data should be utilized the register's role in general cancer research and the use of the register in under developed countries.

Next the Sub Committee discussed the epidemiology of cancer laying stress upon the value of statistical methods in the study of cancer etiology. It ended its session with a group of recommendations that WHO continue publication of reports on cancer mortality publishing rates by sex and age and examining the question whether some form of standardization could be applied as regards rates for all ages that it investigate as far as possible the major apparent differences in mortality between countries that it publish a study on the epidemiology of cancer and cancer registration systems that it co operate with interested organizations on field studies of cancer that it again draw the attention of countries to the definitions and rates the Sub Committee had earlier recommended that a preliminary study be undertaken of problems of classification of neoplasms which would take into account current developments in their histological classification and

that studies continue on the extent to which diagnoses of malignant tumours upon death certificates can be accepted as reliable

Special studies

A number of special statistical studies of cancer have been made by WHO. In 1952 the evolution of cancer mortality in Europe during the twentieth century was described in the *Epidemiological and Vital Statistics Report*⁸. Stress was laid on the degree of caution needed in examining international statistics of cancer mortality and a strong appeal was made for fuller statistics especially through extension of the cancer registration system to help in the elucidation of many obscure points in the epidemiology of cancer.

This study revealed inexplicable differences in the mortality from malignant tumours in various countries, differences which inevitably suggest that more accurate recording and more careful inquiry into the relevant factors are required. It showed however a distinct rise in cancer mortality among the older age groups in all countries, particularly from neoplasms of the respiratory system. It also showed that although mortality from cancer of the uterus had on the whole been stationary, there was a definite increase in deaths registered as due to cancer of the breast in females.

The interest in the marked increase of respiratory neoplasms and in the possible causative or correlative relationship of such factors as smoking led in 1955 to the publication by WHO of available international data in tabular form⁹ and to a further mortality study in the *Bulletin of the World Health Organization*¹.

In view of the heterogeneous character of the data, the study was guarded in its conclusions, but it found an increase in mortality from lung disease in all the countries reviewed, attributable mainly to the increased number of tumours of the trachea, bronchi and lungs. Although it is not entirely clear what proportion of the recorded increase

should be attributed to improved diagnosis, there is nevertheless no doubt that in a significant number of countries of the world today cancer of the lung has become an important medical problem requiring intensive epidemiological research.

In response to current interest in mortality from Hodgkin's disease and leukemia, WHO also in 1955 compiled tables from the available records¹¹.

Another statistical cancer study in the *Bulletin of the World Health Organization* in 1956² reviewed the trends of female mortality from cancer of the breast and genital organs, as shown by the data available to WHO. Here again marked differences in the rate of mortality were found to occur in the countries included in the survey. These uncertainties confirm the need for fuller statistical research into the exact prevalence of the different neoplasms country by country and area by area, and into possible correlative and causative circumstances.

Pathological reference centres

The question of the classification of neoplasms was raised again by a WHO consultant group in 1955³. It suggested that WHO convene groups of specialists on the various types of cancer in which the histological picture and nomenclature were still in dispute. These specialists would seek to define the types of cancer in terms of actual pathological specimens which would be kept in special pathological reference centres and placed at the disposal of interested workers throughout the world. The first centre of this kind was opened in 1958.

Non-governmental contributions

It is particularly in the field of the statistics and epidemiology of cancer that some of the most active international co-operation of non-governmental organizations is taking place. The chief of these organizations is the well

⁸ *Epidemiol. & Stat.* 1955, 5, 1.
⁹ *Epidemiol. & Stat.* 1st Rep. 1955, 2, 11.
¹⁰ *Bull. Wld Hlth Org.* 1955, 12, 687.

¹¹ *Epidemiol. & Stat.* 1955, 8, 81.
Bull. Wld Hlth Org. 1956, 15, 5.
Off. Rec. Wld Hlth Org. 1956, 6, 45.

known International Union Against Cancer with which WHO has established official relationship and which has lent its full authority to the recommendations on nomenclature definition and classification. In many of the registration systems outlined above much support has been given by the national branches of this organization.

One feature of the international study of these conditions which has been specially developed by the International Union Against Cancer in recent years is the examination of geographical variation in the occurrence of different types of cancer. For this purpose the Union has a Committee on Geographical Pathology which met in 1956 in Kampala and in Leopoldville to discuss the problems of primary cancer of the liver in countries south of the Sahara and the general problems involved in the study of the epidemiology of cancer in this region. A further meeting of the Committee in Leopoldville in October 1959 showed that remarkable progress had been made and was continuing in the ascertainment of the frequency of cancer in several areas of Africa. WHO participated in these meetings with a view to providing assistance in statistical methodology.

There are a variety of other international medical and related bodies which are involved in the international study of cancer. There is for example the International Committee on Stage Grouping in Cancer for the Presentation of the Results of Treatment of Cancer appointed by the International Congress of Radiology. The work of this Committee was reviewed by a WHO Expert Committee on Health Statistics¹⁴ which considered that cases of cancer of accessible sites might probably be grouped under four stages to be more precisely defined for each site.

Stage 1—Tumour strictly confined to the organ and of relatively small size

Stage 2—Tumour limited to the organ of origin but of relatively large size or with limited extension beyond the original organ

Stage 3—Tumour with wide infiltration reaching neighbouring organs

Stage 4—Tumour with considerable involvement of adjacent tissues or having spread to neighbouring organs

An important contribution was made by the Council for the Co-ordination of International Congresses of Medical Sciences a special body set up under the joint sponsorship of UNESCO and WHO in its Symposium on the Geographical Pathology and Demography of Cancer held in Oxford in 1950.¹⁵ This meeting recommended *inter alia* that facilities be made available for the exchange of knowledge by workers on similar programmes. Among problems offering useful opportunities for international collaboration were those concerning primary cancer of the liver and cancer of the cervix uteri. The Symposium came out strongly in favour of securing the comparability of published results by the provision in all studies on the frequency of malignant diseases of information concerning the total number of new cases, the population in the area, the percentage of cases, the proportion diagnosed in hospital and the percentage verified by histological or autopsy examination.

The importance of the various non-governmental international organizations to statistical work in the field of cancer cannot be over-emphasized. The ultimate value of international statistical and epidemiological studies of cancer is dependent upon the use by practising physicians, surgeons, radiologists and pathologists of an accepted nomenclature, accepted definitions and an accepted classification in diagnosis, staging and therapy.

Reports of Expert Groups

Effect of radiation on human heredity *

Most of the attempts that have been made to predict the long term effects of radiation on human heredity have been based on the results of investigations in animals as opportunities for studies in human populations are limited. There are however a number of widely scattered areas in which the level of natural background radiation is well above that in other parts of the world and properly planned studies of the populations in such areas could make significant contributions to knowledge of the genetic and somatic effects of prolonged exposure to low levels of radiation. The recently published report of the WHO Expert Committee on Radiation¹ surveys the known areas of high background radiation and sets out the principles of planning investigations of such areas. From the survey it emerges that the Kerala area at the southernmost extremity of the west coast of India is probably the

only area now known which might be profitably investigated and the last part of the report is devoted to the application of the general principles to the planning of what is called "the Kerala project".

The report enumerates the various factors determining the significance of studies of this type and discusses their bearing on the kind of information that should be collected. It points out that the comparison of specific mutant phenotypes in the irradiated and control populations will rarely be feasible and that reliance will usually have to be placed on a comparison of populations with respect to those characteristics that are assumed to reflect the cumulative effect of mutation at many loci. The inter relationship between genetic studies and work which might be undertaken on the somatic effects of radiation is also considered.

The statistical aspects of the proposed studies are examined with regard both to the evaluation of their possible biological significance and to the analysis of the data accumulated. A number of suggestions are also made concerning information to be collected in the Kerala project with particular reference to the *ad hoc* census that would have to be the first step in any such study and a brief section of the report is devoted to the estimated requirements in men and material.

WHO Expert Committee on Radiation (1959) *First report of the Committee on the long term effects of radiation on human heredity*. WHO/H/1/Doc. 20. Geneva, 1959. 47 p. Price 3.6, \$0.60. S. F. 2. Also published in French and Spanish.

Members: The Chairman, Dr. J. A. B. S. den D. J. C. B. Gher, USA. Professor L. Caval. S. F. rza, J. al. Professor A. F. nesch. S. izerland (Vice-Chairman). Dr. A. R. G. I. A. gar. J. d. Professor J. V. Neel, USA (Chairman). Dr. W. I. Sch. (I, USA) (Rapporteur). Dr. A. C. S. evenson, United Kingdom. Dr. R. men. ve of the U. d. N. on Scientific Committee on the Effects of Atomic Radiation. Dr. R. K. A. J. yard. Secretary: Dr. F. S. Eve, WHO (Secretary). Dr. R. L. Dobson, WHO. Dr. P. Dorote, WHO. Dr. V. R. Khan, Ikar. I. dia (Consultant). Dr. D. Klein, S. izerland (Consultant).

Notes and News

A new molluscicide

The expansion of irrigation schemes in East Africa makes it necessary to have a cheap and effective molluscicide to eliminate the vectors of bilharziasis.

A new molluscicide, Bayer 73 (2-hydroxy 5-chloro-4-nitro-benzamide) was reported in

1958 to the International Congress on Tropical Medicine. It has now been tested in East Africa both in field conditions and in the laboratories of the Colonial Pesticides Research Unit, Arusha, Tanganyika, and the Division of Insect Borne Diseases, Nairobi, Kenya. The main snails concerned were species of *B. onchophora*, *B. lina* and *Limnaea*.

In a paper shortly to be published in the WHO Bulletin R Foster C Teesdale & G F Poulton of these laboratories give information on the method of application of Bayer 73 and on sampling techniques used to assess the results

While about 20% of *Bulinus tropicus* survived in the laboratory at a concentration of 1 p.p.m. (part per million) no specimens of this species were found in a river treated with the same concentration. If it can be confirmed that the destruction of the molluscs is as complete as these first trials suggest Bayer 73 is a product with a future. It acts on both adults and eggs over a minimum distance of 3 miles from the point of application. It does not cause snails to leave the water and is not affected by the presence of vegetation. Its toxicity for animals and plants is very low. If—as seems possible—the concentration can be reduced to less than 1 p.p.m. without lessening its molluscicidal effectiveness it may eventually be possible to control snails with a dosage not toxic to fish.

One month after treatment however a sudden re-population of the river by *Limnaea natalensis* was observed and two weeks later two small specimens of *Biomphalaria pfeifferi* were found. No reappearance of *B. tropicus* was noted at that stage. It is possible that some *L. natalensis* were present in the treated area throughout the observations but remained undetected. It may be supposed that the destruction of predators on the eggs hastened the re-population. This example shows that if total eradication is not achieved the few remaining snails may rapidly create new populations because of their high biological potential. The greatest caution should therefore be observed in assuming the disappearance of a snail species simply because no specimens have been trapped or found in hand searches.

Non specific inhibitors in influenza diagnosis

The haemagglutination inhibition test—considered by many research workers to be the best method of detecting influenza antibody—may be falsified by the presence of non specific inhibitors in the serum examined. As this test is used for the

immediate and retrospective diagnosis of influenza and in epidemiological research among both humans and animals suspected of harbouring the virus it is important to make sure that the validity of the results is not affected by this source of error. A number of different methods of inactivating inhibitors have been successively developed over the past fifteen years each seeking to rectify the faults and inadequacies of earlier methods: treatment by simple heating; potassium or sodium periodate; RDE (receptor destroying enzyme) obtained from extracts of *V. cholerae* culture and trypsin. Each of these methods has been found to be inadequate some inhibitors being destroyed but not others. Thus during the 1957-58 pandemic RDE which had previously been considered very effective was found to be incapable of destroying all the non specific inhibitors to which a great number of virus strains—called avid—were particularly sensitive. Non specific inhibitors were not only resistant to simple heating but their titre increased more than eightfold when they were subjected to it. Potassium periodate was recommended as the best method for the destruction of all the inhibitors in animal sera but its action has been found not to be uniform.

In an article shortly to be published in the *Bulletin of the World Health Organization* R Ananthanarayan & C K Jayaram Paniker study the reactions of human sera (from the acute phase and convalescence) and sera of eight animal species with various strains of influenza virus. They conclude that there are qualitative and quantitative differences between the serum inhibitors in the various animal species. The sera from some species have no inhibitors to certain strains—for instance calf, sheep and fowl sera to Shope 15 (swine influenza) and fowl sera to strain FM1. No single method of getting rid of all the inhibitors at once exists. It is therefore suggested that different techniques should be tested and perhaps combined—periodate and trypsin in particular might be tried with changes in concentration and times of action.

The reaction of the inhibitors to periodate and to trypsin appears to indicate that they belong to the class of mucopolysaccharides and mucoproteins. Electrophoretic studies show that there are differences in inhibitors to different strains in the same serum and that the inhibitor pattern to

the same strain varies in different species of sera. Further tests with large numbers of sera are recommended.

Resistance of gonococcus strains to penicillin

Gonococcus strains isolated in 1944 were found to be highly sensitive to penicillin. From 1946 onwards the existence of less sensitive strains was observed. Up to the end of 1955 however doses of penicillin twice to four times as great as those which were effective against the strains isolated in 1944 were enough to stop the development of the less sensitive strains isolated at the Statens Serum Institut, Copenhagen. Then from a case of gonorrhoea without complications four strains were isolated which were found to be only one twentieth as sensitive as the 1944 strains. This discovery and the fact that the incidence of gonorrhoea remained about the same in spite of penicillin therapy suggested that further research on the subject was called for. In a paper to be published in a forthcoming number of the WHO Bulletin, Alice Reyn & M. W. Bentzon summarize their earlier research in this field and discuss their investigations during 1957 and 1958. Some of their findings are given below.

A comparison of several hundred recently isolated gonococcus strains with a hundred strains isolated in 1944 has shown that for inhibition about 25% of the strains sent to the laboratory for diagnosis in 1957 required doses of penicillin 10 times greater than had been needed for most strains originally.

Twenty strains showing reduced sensitivity to penicillin were subcultured for 30 to 90 days on a medium without penicillin without any increase in sensitivity being produced.

Both in 1957 and in 1958 some 100 strains were tested for penicillin sensitivity by the tablet method, i.e. by placing penicillin tablets in the culture medium and measuring the zone of inhibition round them. The zone diameters varied between 0 and 40 mm. In both years about 39% of the strains showed reduced sensitivity, i.e. zone diameters of 34 mm or less. In 1958 however the number of strains with zone diameters of 44 mm or more was signifi-

cantly lower than in 1957 which seems to indicate that the selection (and induction) of the strains with a comparatively reduced penicillin sensitivity continues.

None of the 1957 strains was completely resistant to streptomycin but two of the 1958 strains (from the same patient) were.

In both the 1957 and 1958 strains a significant positive correlation was observed between sensitivity to penicillin and sensitivity to streptomycin.

From June 1957 onwards atypical gonococcus strains—most of them sensitive to penicillin—appeared in the cultures. The growth of these strains on the routine media is poor; they require special conditions for culture and are able to ferment glucose only weakly or not at all. Serological examination showed them to be distinguished from normal strains by the frequent presence of anti-complementary antigens. The proportion of atypical strains rose to 40% in January 1958 and this level was maintained until May 1958 when the culture and fermentation media were changed. The change of culture medium had yet another effect: the inhibition zones of the atypical strains—and of these alone—were greater on ox heart broth than on ox meat broth. This phenomenon has not yet been explained. It is possible that the emergence of atypical strains is related to the mode of action of the penicillin.

Developments in insecticide resistance

Since the beginning of 1958 resistance to insecticides has appeared in a further 16 species, 14 of which are anophelines. For 14 other species both the geographical distribution of resistant populations and the types of resistance encountered have increased. This dangerous situation has led WHO to call for intensified research on the subject.

In an article shortly to be published in the WHO Bulletin, Don W. Micks reviews developments in the situation in 1958 and 1959. He first gives details on the growth of insecticide resistance species by species and then reviews developments in research. In 13 of the anopheline

species that have developed resistance in the period under review this resistance is to dieldrin only. There is convincing evidence that resistance is brought about by selection pressure. Research on cross resistance to various types of insecticide and on the genes responsible for the inheritance of resistance has continued. Thus the dominant factor for phenylurea (PU) resistance in a strain of *Drosophila* has been traced to the same locus on the second chromosome as that which confers resistance to DDT, BHC and parathion, as well as unusual susceptibility to phenylthiourea (PTU). The dominant gene at locus 50 on the third chromosome which confers resistance to nicotine sulfate also confers resistance to PU and PTU. On the basis of these findings an insecticide was prepared containing the minimum amount of PTU needed to kill DDT resistant strains and the minimum amount of DDT required to kill PTU resistant strains. With this combination all the resistant strains in the fly population concerned were killed. Selection pressure with PTU removed the resistance to DDT, BHC and parathion. Combined PTU and PU produced flies resistant to nicotine sulfate.

Food colouring agents

A joint FAO/WHO Expert Committee on Food Additives met in Rome from 30 November to 5 December 1959 to consider specifications for a certain number of natural and synthetic food colouring agents in use in various countries throughout the world. Of the 43 colouring agents reviewed, 26 are organo-synthetic, 13 natural and 4 inorganic. Among the topics discussed were the maximum allowable concentrations of components other than the main compound and specifications for dye content in the commercial manufacture of colouring agents. Natural food colourings contain a large percentage of poorly defined components about which toxicological information is meagre. Extraction and preparation in relatively pure forms or synthetic production of these colouring agents would make it easier to decide how safe they are. In addition to specifications the Committee discussed the identification and assay of the dyes, often a difficult task.

An account of the Joint Committee's work will be published in the *WHO Chronicle* when its report appears.

Education and training in nutrition

A Symposium on Education and Training in Nutrition was held jointly by FAO and the WHO Regional Office for Europe from 2 to 11 December 1959 at Bad Homburg, Germany. It was attended by 60 participants from 22 European countries and from Israel and Tunisia.

While undernutrition in Europe is no longer such a problem as it was only a few years ago, malnutrition in varying degrees still exists in many European countries. Rickets, protein malnutrition and pellagra—not to mention overnutrition—are still important problems. The diets of mothers and children of the elderly and of the sick and disabled need to be improved in many respects. The Symposium stressed the need for further investigations on food consumption and the state of nutrition in Europe to provide a basis for national food policies and education programmes. These investigations would take into account economic, cultural and social factors influencing food habits. It also advocated that institutes be set up to conduct laboratory and applied research and provide training in the scientific and applied aspects of nutrition.

In the opinion of the Symposium, all medical students, physicians, public health doctors and nurses should take courses on nutrition. It was pointed out that the nutrition courses given in many universities could be improved in particular. Nutrition should be taught as a practical subject related to the everyday problems of family life. Those responsible for building or expanding nutrition institutions should have opportunities of visiting good examples of such institutions in other countries and increasing use should be made of certain national nutrition centres to train workers from Europe and from other regions of the world.

Vaccination for travellers

Under the International Sanitary Regulations a health authority may require certificates of vaccination against cholera, smallpox and yellow fever from international travellers. A booklet entitled *Vaccination Certificate Requirements for*

International Travel recently published by WHO lists requirements in this respect for some 180 countries and territories as on 15 December 1959. This publication is bilingual (English and French).

and costs 13s 4d \$7.75 or Sfr 8.— Purchasers will be kept informed by WHO of any changes in the requirements that occur during the following year.

People and Places

Radiation protection

Dr Harold J. Ham of Australia has been appointed WHO consultant to the Governments of Burma and Thailand on radiation hazards and protective measures in this field. He will spend approximately two months in these countries lecturing to staffs of health administrations, medical colleges and hospitals and using on methods of radioactive waste disposal and suggesting ways and means of minimizing radiation hazards. He will also examine X-ray installations. To permit him to make any radiation surveys that may seem indicated, he has been supplied with an EIL portable X-ray dosimeter together with one 35 ml and one 350-ml ionization chamber.

Dr Ham is senior radiotherapist at two leading hospitals in Sydney, a member of two Standing Committees of the Australian National Health and Medical Research Council dealing with radiation and Chairman of the New South Wales Therapeutic Trials Committee. In 1959 he was appointed Vice President of the College of Radiologists of Australasia.

Rural health and community development

As part of its community development programme, the Government of India is expanding health services and training health personnel in a number of areas with help from WHO and UNICEF. WHO has appointed Dr M. A. Shammas as Chief Public Health Officer to the health programme in the State of Uttar Pradesh. This programme, like similar programmes in other States, aims at integrating rural health services into the overall community development programme.

A graduate of the Medical School of the American University, Beirut, Lebanon, Dr

Shammas obtained his DPH degree at the London School of Hygiene and Tropical Medicine. He has experience of public health work in Jordan and Libya, and for the last twelve years he has been Medical Officer of Health in Nazareth, Israel.

Health evaluation in Israel

Dr Karl Evang, Director General of Public Health, Norway, recently went for two months to Israel on behalf of WHO to help the Ministry of Health develop a national health evaluation programme. The immediate purpose of the programme is to analyse the health achievements of the Government of Israel since 1951 when a health teaching mission sponsored jointly by WHO and the Unitarian Service Committee visited the country under Dr Evang's chairmanship.

Dr Evang has been associated with WHO since its foundation and was President of the Second World Health Assembly.

Nutrition

Dr G. R. Wadsworth has been appointed nutrition adviser to the WHO Regional Office for the Western Pacific. He will help governments to plan national nutrition programmes, assess the needs for nutrition personnel, and organize appropriate training. He will also be responsible for the supervision and evaluation of the nutrition projects in the Region for the maintenance of co-operation with other interested agencies, such as FAO and UNICEF, and for acting as liaison officer between the Regional Office and Headquarters on all matters related to nutrition.

A graduate of the University of Liverpool, Dr Wadsworth was on the staff of the Human Nutrition Unit of the London School of Hygiene and Tropical Medicine prior to his appointment.

with WHO. He has had considerable experience of nutrition work in Africa and Asia.

Health and housing

WHO and other specialized agencies are co-operating with the United Nations in a joint programme concerned with low cost housing and related community facilities. Dr William S. Parker of the United Kingdom is helping WHO to determine the extent and scope of its participation.

A graduate of Manchester University, Dr Parker has for many years been Medical Officer of Health for Brighton, England. In this capacity he has been closely associated with the solution of urgent housing problems.

Tuberculosis control in Somalia

Dr Alvez de Souza has been appointed leader of a WHO tuberculosis control team in Somalia. He will help the Government to plan and organize control activities, collect epidemiological information, establish a mobile X-ray unit, train tuberculosis workers and organize tuberculin testing and BCG vaccination. The team will work in a tuberculosis centre now being built in Mogadiscio. Born in Brazil, Dr Alvez de Souza is of Portuguese nationality and received his medical education in Lisbon. He has wide experience of tuberculosis work in Brazil, Portugal and Switzerland.

Reorganization of Lisbon Institute of Hygiene

The Government of Portugal is planning to set up a regular school of public health at the Institute of Hygiene in Lisbon and to reorganize the Institute generally. Professor Paul Antunes

of Brazil is acting as WHO consultant to the Government in this connexion. Professor Antunes has been successively Director General of Health and Secretary of Health in the State of Sao Paulo, Brazil, and was at one time Dean of the School of Hygiene and Public Health, University of Sao Paulo.

Health education in India

Professor Dorothy Nyswander of the United States has been appointed WHO consultant at the All India Institute of Hygiene and Public Health, Calcutta, for a period of three months. In this capacity she will help with the further development of the training courses in health education given at the Institute.

Professor Nyswander was for several years Professor of Health Education at the School of Public Health, University of California, Berkeley.

Malaria appointment

Dr Fang Chun Tsai, formerly of the Hong Kong Public Health Service, has been appointed medical officer on the WHO team which is undertaking a malaria survey in the Republic of Korea as a preliminary to malaria eradication operations.

Dr Tsai joined WHO in 1957 and served for two years as medical officer in charge of malaria eradication in Afghanistan. He obtained his medical degree from Pei Yang Medical School, Tientsin, China, took post graduate courses in malariology and plague control in Calcutta and Bombay, and holds the degree of Master of Public Health from Johns Hopkins University, Baltimore, Md.

Review of WHO Publications

Epidemiological Methods in the Study of Mental Disorders by D. D. Reid. Geneva, 1960. (Public Health Paper No. 2). 73 pages. Price 5/-—\$1.00 or Sw. fr. 3.— French edition in preparation.

Epidemiology is that branch of medical science which studies the factors influencing the incidence and prevalence of disease and its

effects on the community rather than on the individual. It has in the past been concerned mainly with infectious diseases. Its field of application, however, is being steadily extended. In this paper, epidemiological methods are applied to mental disorders with the aim of displaying not only their potential value but also their limitations. The examples chosen illustrate

the practical problems encountered in the design conduct and interpretation of epidemiological studies of mental disorders and the subjects discussed include the use of vital statistics the measurement of mental morbidity and of personal pred sposition towards mental disorder the conduct and pitfalls of surveys of the prevalence of mental d sorders the assessment of genetic and environmental factors the technical aspects of such field procedures as sampling case finding assessment of validity and reliability etc and the carrying out of epidemiological experiments in the control of mental disease

This is not intended to be a textbook of psychiatric epidemiology but an outline of the general principles governing the use of epi

demological methods in psychiatry The text was drafted with the collaboration of Drs Jan Book Ernest Gruenberg and E E. Krapf and has benefited from the suggestions of the experts attending the Joint Technical Meeting on Epidemiological Method in Psychiatry held in London in September 1958 under the sponsorship of WHO the Milbank Memorial Fund the Medical Research Council of Great Britain and the World Federation for Mental Health The author who is Reader in Epidemiology and Vital Statistics at the London School of Hygiene and Tropical Medicine hopes that it will command the agreement of experienced workers and lead to the greater comparability of studies in different parts of the world

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The comparative pharmacology of some psychotropic drugs—*Erik Jacobsen*

The role of psychotropic drugs in individual therapy—*R A Sandison*

The role of psychotropic drugs in group therapy—*R A Sandison*

The relation of drug induced mental changes to psychoanalytical theory—
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Mental health problems of aging and the aged—*Martin Roth*

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VACCINATION AGAINST INFECTIOUS DISEASES

A Conference on the Control of Infectious Diseases through Vaccination Programmes was held in October 1959 in Rabat Morocco by the WHO Regional Office for Europe. Its purpose was to examine different vaccination systems, experience of vaccination in the control and eradication of infectious diseases to date and future possibilities in this field. The article that follows is based on some of the papers presented at the Conference.

Vaccination practices in Europe

Legislation on vaccination

All countries in the European Region have their own laws on vaccination which vary considerably with political and administrative systems. For example in Switzerland and Austria the responsibility in this respect rests with the cantonal and local health authorities only, not with the central government as in nearly all the other countries.

There are also variations in the degree of compulsion: in some countries vaccination is obligatory and fines are imposed for failure to comply with the regulations, while in others it is optional. In most cases, however, there is a mixed system: vaccination against certain diseases is compulsory against others not.

Among compulsory systems that of Czechoslovakia may be taken as an example. In this country the following vaccinations are all compulsory and free of charge: routine vaccinations against tuberculosis, diphtheria, tetanus, whooping-cough, smallpox and poliomyelitis; special vaccinations for persons particularly exposed to infection because of their work; special vaccinations carried out when there is a threat of an epidemic.

Mass vaccination programmes

Mass vaccination is carried out in nearly all European countries, but methods vary a good deal. In some (generally very large)

countries short campaigns are organized by the central health authority with mobile teams. At the other end of the scale are the countries with permanent local services. As a rule vaccination campaigns are based on morbidity and mortality statistics, sometimes supplemented by data from special epidemiological studies and serological surveys. These surveys should be extended; they are at present almost exclusively used for research.

Inspection and evaluation of the results of vaccination should be the work of a central authority. Where vaccination is predominantly optional, they are often neglected.

So far, no satisfactory solution has been found to the problem of the registration of persons vaccinated. One good method is registration on duplicate cards: one copy being kept by the person vaccinated, the other filed in the place where the vaccination is performed. This apparently simple system is, however, rarely administered satisfactorily.

In Czechoslovakia great efforts have been made to solve the problems of a total mass vaccination programme, and for this reason the organization of its services is of interest.

First of all, there is a centralized health system which ensures uniformity in the execution of programmes. It also facilitates continuity of control, which in order to be effective must and does include laboratory control of the quality, effectiveness and safety of vaccines and sera (the State is responsible for control of and research on sera and vaccines); epidemiological control of the effectiveness of sera and vaccines in large scale use; control of the number and periodicity of vaccinations.

There is double registration of vaccinations. One record is kept in child health centres in the children's health cards, which are later passed on to the schools, places of

employment etc (with the exception of records of vaccination against tuberculosis which are kept in special centres) Another record (certificate) is kept by families and all vaccinations are entered in it This record must be produced whenever children attend for a new vaccination

The vaccination records are subsequently inspected by the vaccinating doctors the district medical officers and the regional medical officers They finally reach the chief medical officer of health who compares the data from the different regions with the information on the age composition of the population supplied to him by the National Statistical Office The frequency dates and times of vaccinations are also checked

Financing of vaccination programmes

With very few exceptions the costs in countries where vaccination is compulsory (and frequently in those where it is optional) are borne in their entirety by the central and local authorities Some vaccines e.g. polio myelitis vaccine are not usually however distributed free of charge but in spite of this the demand is considerable

In most European countries vaccines are prepared in non profit making State laboratories In others they are produced by private laboratories which then sell them to the State while in still others both these systems are in use

Health education and mass vaccination

In 1955 an experiment carried out in two villages in Yugoslavia showed very clearly how effective health education can be in preparing the public for mass immunization campaigns It was announced that vaccination against diphtheria and smallpox would not be compulsory that year Instead of the distribution of the usual cards containing a reminder that vaccination was compulsory and that there were penalties if it was not done a series of talks and personal contacts was organized a week before the date fixed for the commencement of vaccination The local doctor explained the aims of the campaign to small groups of people who then discussed it in their homes The result was

that 92% of the children due to be vaccinated attended whereas in the years of compulsory vaccination the average attendance had been 88%

Without entering upon the very controversial topic whether vaccination should be voluntary or compulsory it may certainly be said that, ideally a vaccination programme should be carried out with the full understanding and co operation of everyone concerned even when vaccination is compulsory This can be achieved by means of health education There is no universally applicable method of health education a careful study of local conditions must be made and the health education programme adapted to them Among the most important local conditions to be taken into account are the economic situation religious and social customs and the attitude of the inhabitants to the health problem in question

Methods of health education can be classified into two main groups lectures films radio talks television features etc in which the persons to be educated take no active part and whose effectiveness is for that reason very limited methods which demand the active participation of the persons to be educated such as discussion groups committees interviews etc These are more effective but take more time

In short it may be said that health education of the public can be the decisive factor in the success of a mass vaccination campaign provided the health educators themselves are suitably specialized and have thorough knowledge of teaching methods so that they can at any moment suit the method to the circumstances

Effectiveness of vaccination

This depends upon the quality of the vaccine and the conduct of the campaign A series of laboratory and practical tests is also required to assure the effectiveness of some of the vaccines in use Problems continually arise in connexion with nearly all the vaccines used at present and these require a quick solution They are sufficiently important and varied to justify separate study of each of the chief vaccines now in use

Recent contributions to preventive vaccination

Vaccination against tuberculosis

Although BCG is still the vaccine used everywhere against tuberculosis some countries are preparing vaccines from murine bacilli. However these products are still in the experimental stage. In Italy an anti tuberculosis vaccine prepared from killed bacilli is used but it is confined to that country. Increasing interest has been shown in freeze-dried vaccine ever since its introduction in 1946 and it is now used in many countries especially in the tropics. Some recent studies have in fact shown that a good freeze-dried vaccine gives as high a rate of tuberculin conversion as the fresh vaccine although little is yet known about the duration of allergy after administration of dried vaccine.

The intradermal method is the most widespread although the multipuncture technique is also sometimes used. At present there is great interest in the method of repeated oral administration of large doses of vaccine but more information is needed for a reliable evaluation of this method.

It is agreed that vaccination should be performed at the time when the subject is most exposed to the risk of infection. In countries where tuberculosis is very prevalent vaccination should be performed at birth and subsequently repeated. In countries where it is less prevalent children can be vaccinated when they leave school or take up an occupation in which they would be particularly exposed.

Pre vaccination tuberculin testing is considered necessary in order to prevent the Koch phenomenon. It is not essential however to apply post vaccination testing to everyone: it is sufficient to test sample population groups.

Vaccination against poliomyelitis

At present two distinct types of poliomyelitis vaccine are available: both capable of conferring active immunity: they are formaldehyde inactivated vaccine and live attenuated vaccine.

Immunity with inactivated (Salk) vaccine. Considerable experience has already been acquired with this type of vaccine. The

most generally accepted procedure is to give two or three 1 ml doses of vaccine subcutaneously or intramuscularly at intervals of four weeks followed by a booster dose 8-12 months later. In some countries the intradermal method has been used chiefly when the vaccine has been in short supply but in nearly all cases the other routes of administration have been adopted when adequate amounts became available. It cannot yet be definitely affirmed that further booster doses are necessary although there is evidence suggesting that antibody titres are on the wane two or three years after the last booster injection. The present procedure is to carry out primary immunization between the sixth and eighth months of life as this is the moment when the level of antibodies—both maternal and acquired—is lowest.

Space does not permit enumeration of all the studies that have been made to date to prove the effectiveness of this type of vaccine. Some very interesting figures obtained in Ontario during the 1957 epidemic were cited at the Conference: 17 cases of paralytic poliomyelitis were observed among 1 800 000 children vaccinated as against 21 cases among 300 000 unvaccinated children. Similar results have been reported from many other countries. However it is unanimously agreed that there is no hope of eradicating poliomyelitis by this kind of vaccination in its present form.

Immunity by live attenuated vaccine. The basic problem of this type of vaccine is the need to ascertain the extent of immunity and its duration: that the virus obtained is free from paralytogenic properties: that when it is excreted by the vaccinee and spreads among contacts it does not develop such properties: and that the virus used is capable of immunizing the subject.

The trials made so far have not always been carried out under conditions productive of reliable conclusions. But large scale vaccination carried out in Singapore is of special interest, in that no accident occurred which could directly or indirectly be attributed to the use of the vaccine. Also of great interest are the campaigns conducted in various parts of the Soviet Union, Poland and Czechoslovakia (see article on page 142).

Vaccination against influenza

The most important problem in the manufacture of influenza vaccine is the constant antigenic variation in the virus

It was found that some people alive during the 1889-1890 influenza epidemic possessed antibody against the 1957 Asian type of influenza. It has therefore been suggested that antigenic characteristics of the virus may be expected to reappear after about 70 years. It is as is thought an important antigenic change occurs every 10-12 years such as the appearance of a new subgroup then six to seven such changes can be expected in 70 years. If this hypothesis is correct then since at the present time there are three subgroups it will be necessary to wait for the appearance of three or four new ones until a vaccine can be manufactured which will contain all the viruses representing the most important antigenic variations. Apart from the fact that this hypothesis is very tentative there also remains the fact that a vaccine with so many components might have too weak an effect against a virus corresponding to one of them. It must therefore be admitted that vaccination against influenza cannot be considered as an effective control measure at present and that it is not likely to be so in the near future.

The vaccine prepared from live attenuated virus does not seem to give any better results than the usual type produced from inactivated virus. In the USSR where live vaccine has been used a reduction in morbidity of 50-75% has been reported. Among persons vaccinated by inhalation of the virus in the form of an aerosol 5-10% showed general toxic reactions. This type of vaccine is not suitable for children under 10 years of age owing to the high incidence of febrile reactions.

A number of interesting immunological problems await solution. In principle it would seem that circulating antibody can hardly be responsible for protection since viraemia is unknown in influenza.

On the other hand after both natural infection and vaccination neutralizing antibody has been detected in the nasal secretions and it probably exists on the surface of the entire respiratory tract. It is very likely that this surface antibody determines the degree of

protection in spite of the fact that it does not represent more than about 3% of the circulating antibody.

If the vaccine is administered by the intranasal route a higher concentration of surface antibody is obtained but epidemiological studies have not shown that the vaccine has any greater protective power when administered in this way.

A very interesting observation was made recently to the effect that immunity of the alveolar cells in experimental animals (ferrets) lasts longer than that of the cells of the upper respiratory tract. Intranasal instillation of a pneumotropic strain of influenza virus in an immunized animal may cause infection of the upper respiratory tract without symptoms of pneumonia. This is particularly important in human immunization for in a large proportion of deaths from influenza the immediate cause is virus pneumonia with or without secondary bacterial infection.

Vaccination against typhoid and paratyphoid fevers

In spite of the fact that vaccine against typhoid fever has been used for a long time no strictly controlled epidemiological trials were carried out until quite recently.

The first practical controlled test started in 1953 in Yugoslavia under the auspices of WHO. The subjects for the experiment were divided into three comparable groups: one group received alcohol-killed alcohol-preserved vaccine of the Felix type, the second was given heat-killed phenol-preserved vaccine, and the third was given an inert vaccine (placebo). The Felix type vaccine conferred little or no immunity but the heat-killed phenolized vaccine was found to be effective especially in young persons. In all some 70% of the vaccinees were protected. This experiment also showed that it was sufficient to administer booster injections every three to four years—a particularly important point in view of the fact that these injections usually provoke stronger reactions than the primary vaccination.

Summing up it may be said on the basis of present knowledge that vaccination against

typhoid is advisable in places where the disease is endemic. Nevertheless further laboratory studies and field trials are necessary before a definite conclusion can be reached about the relative effectiveness of the different vaccines and the best means of applying them.

The effectiveness of vaccination against paratyphoid fever has never been satisfactorily proved although some recent studies seem to indicate that in particular the vaccine against paratyphoid A is useful although much less so than antityphoid vaccine. Further studies with adequate controls are necessary before any final conclusions can be drawn.

Vaccination against brucellosis

Since brucellosis prophylaxis with vaccine prepared from killed bacteria has not been very successful a vaccine has been produced from attenuated *Brucella* strains.

A vacuum-dried live vaccine is at present being used in the Soviet Union. It is prepared in a concentration of 500 000 micro-organisms per ml for subcutaneous injection and in a ten times higher concentration for scarification.

Vaccination against brucellosis can be more effectively carried out in regions where occupational brucellosis is more common than brucellosis of alimentary origin. Since the introduction of mass vaccination in the Soviet Union the overall incidence of brucellosis has decreased by some 60%. The decrease has been mainly in occupational brucellosis which at present is 3.3 times less frequent among veterinary workers and between 7 and 8 times less frequent among shepherds; it has disappeared altogether amongst workers in the meat industry. Very significant is the fact that in the Kirghiz Soviet Socialist Republic 1111 cases were notified in 1952 and only 33 in 1958.

Through the initiative of public health services in the Soviet Union both large and small horned livestock have been vaccinated with live vaccine from 1955 onwards. It is as yet too early for definite conclusions about the effectiveness of this method.

Vaccination against diphtheria tetanus and whooping cough

In many European countries diphtheria is still a considerable problem and in some pertussis and tetanus are perhaps greater problems than poliomyelitis.

Potent antigens for immunization against diphtheria and tetanus have been known for a long time. They should be used adsorbed either on to pertussis vaccine or on to an alum preparation. If the right antigens are used in the right age groups and a sufficient proportion of the population is vaccinated these diseases can be brought under control as has been shown clearly with diphtheria in many countries.

A good pertussis vaccine gives 80-90% protection for several years. It should be used early as up to 70% of deaths from pertussis occur in the first year of life. It should not be used to vaccinate school age children because of the severe reactions. The local or general reactions that occur in 50-70% of children are not a contra-indication to immunization programmes. Convulsions are a rare hazard and much rarer is encephalopathy with symptoms appearing within 24 hours of the inoculation.

Active immunization against tetanus should replace antitoxin administered prophylactically. Tetanus vaccine is cheap and potent. Immunization of the mother during pregnancy may be carried out to prevent neonatal tetanus but further investigations in this field are required. Proper individual records are of great importance with this vaccine.

Vaccines against diphtheria tetanus and pertussis may advantageously be used in combined form for immunization in early childhood.

Immunization programmes recommended

The Conference suggested two model schedules: one for areas with well-developed medical services, the other for areas with inadequate medical services. They cover five diseases: smallpox, diphtheria, pertussis, tetanus and poliomyelitis. Requirements vary greatly for tuberculosis and typhoid fever be-

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protection in spite of the fact that it represents more than about 3% of the circulating antibody.

If the vaccine is administered by the intranasal route a higher concentration of antibody is obtained, but epidemiological studies have not shown that the vaccine has any greater protective power when administered in this way.

A very interesting observation was made recently to the effect that immunity of alveolar cells in experimental animals (ferrets) lasts longer than that of the cells of the respiratory tract. Intranasal instillation of a pneumotropic strain of influenza virus in an immunized animal may cause infection of the upper respiratory tract without symptoms of pneumonia. This is particularly important in human immunization for in a large proportion of deaths from influenza the immediate cause is virus pneumonia with or without secondary bacterial infection.

Vaccination against typhoid and paratyphoid fevers

In spite of the fact that vaccine against typhoid fever has been used for a long time no strictly controlled epidemiological trials have been carried out until quite recently.

The first practical controlled test started in 1953 in Yugoslavia under the auspices of WHO. The subjects for the experiment were divided into three comparable groups. One group received alcohol killed alcohol preserved vaccine of the Felix type, the second was given heat killed phenol preserved vaccine and the third was given an inert vaccine (placebo). The Felix type vaccine conferred little or no immunity but the heat killed phenolized vaccine was found to be effective especially in young persons. In all some 70% of the vaccinees were protected. This experiment also showed that it was sufficient to administer booster injections every three to four years—a particularly important point in view of the fact that these injections usually provoke stronger reactions than the primary vaccination.

Summing up it may be said on the basis of present knowledge that vaccination against

hold is advisable in places where the case is endemic. Nevertheless further oratory studies and field trials are necessary before a definite conclusion can be reached about the relative effectiveness of the different vaccines and the best means of applying them.

The effectiveness of vaccination against paratyphoid fever has never been satisfactorily proved although some recent studies seem to indicate that in particular the vaccine against paratyphoid A is useful although much less so than antityphoid vaccine. Further studies with adequate control are necessary before any final conclusions can be drawn.

Vaccination against brucellosis

Since brucellosis prophylaxis with vaccine prepared from killed bacteria has not been very successful, a vaccine has been produced from attenuated *Brucella* strains.

A vacuum-dried live vaccine is at present being used in the Soviet Union. It is prepared in a concentration of 500 000 micro organisms per ml for subcutaneous injection and in a ten times higher concentration for scarification.

Vaccination against brucellosis can be more effectively carried out in regions where occupational brucellosis is more common than brucellosis of alimentary origin. Since the introduction of mass vaccination in the Soviet Union the overall incidence of brucellosis has decreased by some 60%. The decrease has been mainly in occupational brucellosis which at present is 3.3 times less frequent among itinerant workers and between 7 and 10 times less frequent among shepherds; it has disappeared altogether amongst workers in the meat industry. Very significant is the fact that in the Kirghiz Soviet Socialist Republic 111 cases were notified in 1957 and only 33 in 1958.

Through the initiative of public health services in the Soviet Union both large and small horned livestock have been vaccinated with live vaccine from 1955 onwards. It is as yet too early for definite conclusions about the effectiveness of this method.

Vaccination against diphtheria, tetanus and whooping cough

In many European countries diphtheria is still a considerable problem and in some pertussis and tetanus are perhaps greater problems than poliomyelitis.

Potent antigens for immunization against diphtheria and tetanus have been known for a long time. They should be used adsorbed either on to pertussis vaccine or on to an alum preparation. If the right antigens are used in the right age groups and a sufficient proportion of the population is vaccinated these diseases can be brought under control as has been shown clearly with diphtheria in many countries.

A good pertussis vaccine gives 80-90% protection for several years. It should be used early as up to 70% of deaths from pertussis occur in the first year of life. It should not be used to vaccinate school age children because of the severe reactions. The local or general reactions that occur in 50-70% of children are not a contra-indication to immunization programmes. Convulsions are a rare hazard and much rarer is encephalopathy with symptoms appearing within 24 hours of the inoculation.

Active immunization against tetanus should replace antitoxin administered prophylactically. Tetanus vaccine is cheap and potent. Immunization of the mother during pregnancy may be carried out to prevent neonatal tetanus but further investigations in this field are required. Proper individual records are of great importance with this vaccine.

Vaccines against diphtheria, tetanus and pertussis may advantageously be used in combined form for immunization in early childhood.

Immunization programmes recommended

The Conference suggested two model schedules: one for areas with well-developed medical services, the other for areas with inadequate medical services. They cover five diseases: smallpox, diphtheria, pertussis, tetanus and poliomyelitis. Requirements vary greatly for tuberculosis and typhoid fever be-

Vaccination against influenza

The most important problem in the manufacture of influenza vaccine is the constant antigenic variation in the virus

It was found that some people alive during the 1889-1890 influenza epidemic possessed antibody against the 1957 Asian type of influenza. It has therefore been suggested that antigenic characteristics of the virus may be expected to reappear after about 70 years. If as is thought an important antigenic change occurs every 10-12 years such as the appearance of a new subgroup then six to seven such changes can be expected in 70 years. If this hypothesis is correct then since at the present time there are three subgroups it will be necessary to wait for the appearance of three or four new ones until a vaccine can be manufactured which will contain all the viruses representing the most important antigenic variations. Apart from the fact that this hypothesis is very tentative there also remains the fact that a vaccine with so many components might have too weak an effect against a virus corresponding to one of them. It must therefore be admitted that vaccination against influenza cannot be considered as an effective control measure at present and that it is not likely to be so in the near future.

The vaccine prepared from live attenuated virus does not seem to give any better results than the usual type produced from inactivated virus. In the USSR where live vaccine has been used a reduction in morbidity of 50-75% has been reported. Among persons vaccinated by inhalation of the virus in the form of an aerosol 5-10% showed general toxic reactions. This type of vaccine is not suitable for children under 10 years of age owing to the high incidence of febrile reactions.

A number of interesting immunological problems await solution. In principle it would seem that circulating antibody can hardly be responsible for protection since viraemia is unknown in influenza.

On the other hand after both natural infection and vaccination neutralizing antibody has been detected in the nasal secretions and it probably exists on the surface of the entire respiratory tract. It is very likely that this surface antibody determines the degree of

protection in spite of the fact that it does not represent more than about 3% of the circulating antibody.

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tween different countries so that a model schedule of immunization against these two diseases cannot be laid down

The schedules recommended are as follows

(a) *For areas with adequate public health medical services (to be modified as required to suit local conditions)*

Age	Prophylaxis
2-6 months	Diphtheria pertussis tetanus triple vaccine 3 doses with 1 month's interval between each dose
6-7 months	Smallpox vaccination
7-10 months	Poliomyelitis vaccine (inactivated) 2 doses with 1 month's interval
15-18 months	Booster dose of triple vaccine simultaneously third dose of poliomyelitis vaccine
2-4 years	Fourth dose of poliomyelitis vaccine
5-6 years	Booster dose of diphtheria tetanus vaccine simultaneously smallpox re-vaccination
10-15 years	Booster dose of diphtheria tetanus vaccine if Schick test positive no injection of diphtheria prophylactic in Schick pseudo-reactors

Tetanus An individual who has been effectively immunized with a primary course of tetanus toxoid followed by 1 or 2 booster doses should be given a further dose of tetanus toxoid if exposed to the risk of tetanus. If the injury is extensive a dose of tetanus antitoxin should also be given. If tetanus antitoxin is given to a non immunized individual active immunization with tetanus toxoid should be begun 4 to 6 weeks later.

Poliomyelitis The use of live attenuated poliovirus vaccine is not included in this schedule because of the still limited knowledge about its efficacy when given orally to infants. This procedure may become the method of choice in countries where there is a high incidence of clinical disease in early infancy. In these countries immunization with inactivated vaccine may have to be begun earlier than suggested in the schedule

but in such circumstances the antibody response will be negligible in a considerable proportion of infants because of the presence of maternal antibody.

It is suggested that the fourth dose of polio virus vaccine be given within 1 to 2 years after the third dose of the primary course since (a) antibody titres may have fallen to low levels by that time and (b) clinical disease has occurred in children after three doses. If the polio antigens particularly types 1 and 3 are improved it may be possible to postpone the fourth dose until school entry.

Quadruple vaccine (DPT and polio) is not recommended at present.

(b) *For areas with inadequate medical services (to be modified as required to suit local conditions)*

Age	Prophylaxis
3-6 months	Smallpox vaccination and simultaneously first dose of triple vaccine with alum
	Second dose of triple vaccine 1 to 3 months after first dose
5-6 years	Booster dose of diphtheria tetanus vaccine simultaneously smallpox re-vaccination

It is envisaged that schedule (b) will be used in countries with a low incidence of clinical poliomyelitis. In such areas poliomyelitis vaccine should not be employed routinely but should be available to those at special risk of clinical disease.

Smallpox and triple vaccine should not be given simultaneously to infants with a history of convulsions or other evidence of central nervous system disease or to those convalescing from an acute infection.

The injection of an alum-containing mixed vaccine carries a slight risk of favouring the development of poliomyelitis in young children. It is recommended that the content of aluminium hydroxide or phosphate should not exceed 2 mg/ml and that the mixture should not be given to infants over 6 months of age.

LIVE POLIOVIRUS VACCINE

*The past year [1958] has witnessed the first national
live poliovirus vaccine being tested in the United States
for its effectiveness in preventing the disease. The
first test is being conducted in the United States
health program.*

ALBERT SABIN¹

Millions of children and young adults have been vaccinated against poliomyelitis in recent years by means of formalin inactivated poliovirus—the Salk vaccine—administered subcutaneously. Under the action of the formalin the virus loses its infective properties and ability to multiply but retains a capacity to stimulate antibody formation in the organism and therefore to confer protection against the disease. This protection has proved satisfactory since in numerous countries where large groups of the population have been vaccinated it has lessened the number of paralytic cases. However its efficacy is probably of limited duration and might not be enough to ensure the general protection of the population at risk in a serious epidemic.

An ideal vaccination should confer the same degree of immunity as is given by the natural disease but without producing untoward side effects. Vaccinations against smallpox and yellow fever are the stock examples of effective protection against virus diseases with risks reduced to a minimum. Researchers have accordingly for several years past aimed at producing a poliovirus vaccine which unlike the formalinized product would be living and which would multiply in the organism stimulate the formation of antibodies and confer protection to the same degree as a natural infection. By selection of the plaques produced by virus colonies on tissue cultures the viruses with the most attenuated paralytogenic properties were sought so that no danger would be involved for those vaccinated. A vaccine of this kind has the advantage of being administered

orally and thus of being more convenient for systematic mass immunization.

The virus of poliomyelitis is one of those enteroviruses of which more and more are being discovered some being recognized as pathogenic though the disease-causing role of others is still uncertain. Paralytogenic polioviruses are able to invade the central nervous system and by their pathogenic effect on the cells to bring about various degrees of paralysis. The virus multiplies in various parts of the body—Peyer's patches, the tonsilopharyngeal tissue or the lymph glands—although this does not determine the site of the visible lesions. Viraemia may be more or less marked and its role in infection and immunity is still a moot point.

Live poliovirus vaccine taken orally in liquid form or as capsules containing liquid passes back into the intestines, develops there and is then excreted in the stools and possibly in the pharyngeal secretions. In communities where children live in close contact these excreted viruses will pass from one child to another and a phenomenon unique in the history of vaccination can then be observed—a natural "serial" immunization spreading from one vaccinated child to several other children. This would be an undoubted advantage if one could be certain that the vaccine viruses will remain attenuated, i.e. that after passing into the intestines and no longer being subject to human control they will not regain virulence and become dangerous pathogenic agents at large in the population.

The fear that this might happen was voiced after studies in various countries had indicated that the viruses excreted by vaccinated persons were of a higher degree of neurovirulence

¹ Pan American Sanitary Bureau (1959) *Live poliovirus vaccine*. Washington, D.C., p. 14.

for monkeys than the vaccine virus. However the authors reported no evidence of progressive increase in neurovirulence for monkeys during prolonged multiplication in the vaccinated individual or after serial passage of virus in human beings.

How can we be certain of the stability of the vaccine viruses? How can we distinguish in the laboratory between the vaccine virus and the various enteroviruses or possible variants of the original virus? How can we assess the degree of protection conferred? What is the role of the other enteroviruses and what happens when they co exist in the intestines or tissues with the poliomyelitis vaccine virus? To answer these questions exchange experiences and compare results a group of eminent specialists i.e. those who created the attenuated vaccine tested it and took the responsibility of using it in practice met at the First International Conference on Live Poliovirus Vaccines held in Washington D.C. from 22 to 26 June 1959 under the auspices of the Pan American Sanitary Bureau the World Health Organization and the Sister Elizabeth Kenny Foundation.

The detailed report on these discussions and an account of some 20 vaccination campaigns in 15 countries have just been published in a volume entitled *Live Poliovirus Vaccines*. In addition a newly published issue of the *Bulletin of the World Health Organization* contains several important articles on live poliomyelitis vaccines and in particular accounts of certain mass campaigns carried out with the assistance of the Organization.¹

Vaccination campaigns

In 1957 the WHO Expert Committee on Poliomyelitis considered that studies had reached a stage at which large scale trials in man were indicated in cases where special epidemiological conditions existed e.g. where a population was threatened with an epidemic or in endemic areas where there were signs of a shift to the epidemic form of the disease.

The Committee recommended that the vaccines used should have given proof of their harmlessness in laboratory tests on monkeys and should have been tested also on small groups of people. Thus during the two years preceding the large scale campaigns described below limited trials were carried out in family groups and children's homes in the United States of America (Louisiana and Minnesota in particular) the Netherlands Poland Sweden and the USSR. Then larger groups were vaccinated 3000 children in Mexico about 150 000 in Czechoslovakia and 200 000 in Singapore. In Louisiana it was found that the transmission of the viruses from vaccinated persons to contacts was much more frequent in groups of persons at a low social and economic level (51% of household contacts infected) than among groups in which hygiene was better (8% infected). Several attenuated vaccines were used particularly the Sabin Koprowski and Lederle vaccines.

The USSR¹

In 1956 the attenuated Sabin virus was studied in monkeys at the Institute of Virology in Leningrad. In 1957 it was administered to 150 infants and in 1958 to 2500 children under school age. In view of the strong evidence in favour of its harmlessness and efficacy the USSR Ministry of Health then authorized general use of the vaccine and by the end of May 1959 it had been administered to several million children in various republics of the USSR. In describing these experiments at the Washington Conference Smorodintsev and his colleagues emphasized that the vaccine stored in the frozen state at -12 or -15 C is extremely stable and that its activity is maintained at the same level for one to two years. The vaccine used contains 100 000 tissue culture infective doses (TCID₅₀) per 0.1 ml. It is administered by means of a dropper. The vaccination schedule consists of the consecutive administration of virus types 1, 3 and 2 at intervals of three to four weeks or of administration in two stages: first type 1 then a month later types 2 and 3. Under these conditions the percentage of serological reac-

tions to type 1 is 95 to type 2, 80 and to type 3 75. If under this schedule the antibody titre falls after a time to an unsatisfactory level the three types of virus can be administered again a year later.

The viruses multiply well in the intestines and reach high concentrations in children without antibodies in their blood. They are found in the intestinal contents on the day following administration and reach maximum titres on the seventh to fourteenth day. They may be excreted for as long as 50 days. The intensive reproduction of the viruses and their excretion lead, as explained above, to extensive spread of the vaccine virus. In a specific case described by the Soviet workers 50% of the non-vaccinated contacts had become virus carriers within 30-50 days of the vaccination. In the majority of these virus carriers contamination by contact had led to antibody formation. The Soviet authors furthermore declared that the most important feature of the live vaccine is its ability to stimulate the development of local immunity in the intestinal canal. Thus when the same type of virus is administered to vaccinated children six months after the primary immunization it multiplies only to a small extent and slowly. This form of immunity about which little is yet known requires further study.

*Leopoldville (Belgian Congo)**

Paralytic poliomyelitis is endemic and epidemic in Leopoldville. Rodhain studied it there as long ago as 1919. Since 1951 there have been on the average 58 new cases a year—a rate of 18.8 per 100 000 inhabitants. More than 90% of cases have occurred in African children under 3 years of age. Encouraged by the success of vaccination campaigns which in 1957 covered some 250 000 inhabitants of Ruanda Urundi and other territories in the Belgian Congo it was decided to vaccinate the most susceptible population group in Leopoldville, i.e. African children under 5 years of age. For various reasons this city was particularly suitable for testing the harmlessness of the vaccine and for studying the

virus. In the Ancienne Cite 125 000 Africans live in conditions of overcrowding and poor hygiene which favour the passage of the virus from one child to another. Furthermore 21.7% of the city's African inhabitants fall within the susceptible age group. In addition the health services and hospitals are excellent and ensure that the results of vaccination are conscientiously assessed. The vaccinations were carried out in community centres, dispensaries, schools or well-baby clinics or at the Wanson Institute where every inhabitant of Leopoldville has to undergo an annual examination for sleeping sickness, tuberculosis, leprosy and venereal diseases.

The vaccine used consisted of attenuated viruses of Koprowski's CHAT strain. The virus on which this vaccine is based comes from the fourth human passage of a virus pool of type 1 (SM). The faeces were passaged on monkey kidney culture and then certain plaques (cytopathological lesions caused by the virus as it develops in colonies on the tissue culture) were again given several passages in tissue culture. The viruses thus obtained were remarkably attenuated as was indicated by their lack of intracerebral and intraspinal pathogenicity.

Blood specimens were taken before and after vaccination in order to establish the percentage of children susceptible to type 1 and to all three types. By the end of April 1959 almost 46 000 children had been vaccinated and about one in five of them had been re-examined 8-15 days after vaccination in a vaccination centre or by visiting nurses. None of the cases of illness reported among these children in the weeks following vaccination was either paralytic poliomyelitis or aseptic meningitis. Poliomyelitis was also excluded as the cause of an acute encephalitis which occurred in a vaccinated child.

The vaccination campaign had been under way for two months when an epidemic of paralytic poliomyelitis broke out in Leopoldville with 99 cases and 4 deaths, i.e. a morbidity rate of 28.6 per 100 000 (344 per 100 000 for 1 year olds). As in previous epidemics 90% of the cases were in the age group 3 years and under. Eighty-nine of the cases occurred in non-vaccinated children. The

distribution of the cases by age group was the same as in previous epidemics but in contrast to the usual picture cases were relatively less frequent in the Ancienne Cite. The figures are too small to furnish statistical proof of the effect of vaccination. It is not unreasonable however to assume that it was important although it is possible that some unknown epidemiological factor played a part. The hypothesis of the vaccination having caused the disease in two cases in which the incubation period made this a possibility did not according to the authors stand up to serological and genetic analysis which showed that the pathogenic viruses were different from the CHAT virus.

To the surprise of the investigators the serological reaction was positive only in 60% of those vaccinated in Leopoldville whereas in other limited population groups in the United States and Poland the serological efficacy of the CHAT strain was 90-95%. Negligence and faulty administration can be ruled out and the most plausible explanation seems to be that given by various authors who have observed similar results in regions where hygiene is not at a high level i.e. probable interference with the poliomyelitis vaccine virus by wild enteroviruses normally present in the intestines of the vaccinated persons. At Leopoldville such competition between viruses seems probable to judge from the investigation recently made there by Vandeputte⁶ who isolated enteric viruses from 37% of 1200 faeces specimens obtained during a single year from African children under 5 years of age who were subject to epidemics of virus diarrhoea.

This phenomenon of interference between viruses contributes to a paradoxical situation in poliomyelitis protection. In environments where hygiene is at a high level and over crowding rare i.e. where the risks of mutual contamination are lowest the children are not naturally protected by subclinical infections occurring when they are young and remain dangerously susceptible to the virus. On the other hand in communities where hygiene is rudimentary and where children contract subclinical infections at an early age

and are carriers of enteric viruses the latter can prevent effective antipoliomyelitis vaccination and hinder the formation of protective antibodies.

Andes (Colombia)

In Colombia paralytic poliomyelitis is a disease of scarcely more than minor public health importance. The highest incidence reported was 1.6 per 100 000 inhabitants in 1953. While the paralytic form of the disease is rare poliovirus infection seems to be very widespread in certain regions of the country to judge from the antibody level observed from the age of 2 years onwards. In the 7 to 9 year old age group 88% of the children have antibodies to the three types of virus a phenomenon which occurs in other areas of the world with similar social and economic conditions.

In January 1958 cases of paralytic poliomyelitis were reported from the municipality of Andes in the State of Antioquia in a commune which was partly urban and partly rural situated in a mountainous area between 1000 and 3000 metres above sea level. The fear of a shift from the endemic to the epidemic form of infection impelled the authorities to undertake a campaign of vaccination with attenuated virus with the aid of the Pan American Sanitary Bureau which serves as the WHO Regional Office for the Americas. The vaccine used was of the same strain as that which had given satisfactory and reassuring results among small groups in Minnesota. More than 7000 children were vaccinated with three successive oral doses of the three types of vaccine. Of the children serologically negative to the three types before vaccination 91% responded to the administration of type 1, 72% to type 2 and 87% to type 3. Among those with poliomyelitis antibodies already in the blood the vaccine had a booster effect quadrupling the original antibody titre. The few cases of poliomyelitis reported in Andes since the campaign have not been among vaccinated children and no untoward side effects have been recorded.

It is interesting to compare the virulence of the virus used for the vaccine with that of the

poliovirus causing one of the paralytic cases which led to the fear of an epidemic. While 2 TCID₅₀ of the pathogenic virus paralysed an intracerebrally infected monkey more than 10 million TCID₅₀ of the attenuated vaccinal virus were required to cause the slightest paralytic symptom among monkeys of the same species inoculated by the same route.

Possible reversion of the attenuated viruses to virulence

Attenuated poliomyelitis viruses obtained in accordance with the principles described on page 137 are less neurotropic or non neurotropic for the primates including man. Neurotropism however is not a fixed and immutable quality inherent in a particular poliovirus and transmitted to the strain derived from it. It can show a wide range of variation and depends moreover on the susceptibility of the neurones with which it comes in contact. The fact that the inferior motor neurones are more highly resistant in the primates has been established beyond doubt and it seems certain that the higher the position in the evolutionary scale the lower the sensitivity to the poliovirus of the neurones and the higher the sensitivity of the digestive system.

The site of the test inoculation of the monkey when the neurotropic qualities of a virus are being assessed is of great importance and should be specified for comparative tests of the harmlessness of the vaccine since monkeys show different levels of susceptibility depending on whether an intracerebral injection is made in the thalamic region or an intraspinal injection in the grey matter of the lumbar enlargement of the spinal cord.

A crucial problem arises with regard to the possibility of a reversion of the attenuated virus to virulence. How can the vaccine viruses be differentiated from "wild" viruses in faecal specimens in the absence of any distinguishing morphological characteristic even of an ultra microscopic kind. This question becomes acute (a) when it is necessary to establish whether an attack of poliomyelitis in a vaccinated person or contact could be due to a mutation of the attenuated virus (b) if

the incidence of poliomyelitis increases in a vaccinated population and (c) when it is proposed to vaccinate the population during an epidemic.

Sensitive serological methods based on the inhibiting action of the specific sera of strains on virus cultures in monkey kidney tissue have been elaborated. The specific serum prevents the formation of plaques in the case of a homologous virus and has no effect in the case of a heterologous virus.⁷

Recourse is also had to what are called genetic methods using "markers" which appear to be stable. Among the reference characteristics for poliovirus the following have been chosen:

- (1) plating efficiency under agar of low bicarbonate content
- (2) the appearance of the plaques in tissue cultures of fresh monkey kidney and established lines of monkey kidney (the MS character)
- (3) the ability of the virus to develop or not at a temperature of 40-41°C

There seems to be a close correlation between the ability of type 1 virus to develop at a high temperature and its neurovirulence. It may even be supposed that these two characteristics are genetically identical or very closely related.

As related above a comparison between epidemic viruses and vaccine viruses proved necessary during the Leopoldville epidemic which broke out during a vaccination campaign. Koprowski et al.⁸ analysed these two viruses and showed that they were different. This analysis confirmed the indications that some characters were inherent in the attenuated forms and the contrary characters in the "virulent" forms.

Achievements and needs

It was the opinion of the Washington Conference that while the inactivated (Salk) vaccine has proved its value and can be strongly recommended its use does not preclude that of a less expensive and more easily

Bull. Wild Hlth Org. 1960 22, 35
Bull. Int'l Hlth Org. 1960 22, 43

administered vaccine which might replace the wild paralytogenic strains in nature by strains with lessened neurotropism. However the fact which in itself has certain advantages that the vaccine virus spreads to contacts is not without its risks since its spread cannot be controlled. These risks were discussed and assessed at length by the Conference. The neurovirulence of the vaccine virus has hitherto been considered as the factor involving the greatest risk. Other factors however also require study: the invasive power of the virus in the organism; viraemia in vaccinated persons; the contagious properties of the virus and its ability to spread from one person to another; its genetic stability and the value of certain markers as criteria of infectivity permitting differentiation between wild polioviruses and the viruses excreted by vaccinated persons.

It remains difficult to assess the results of vaccination campaigns particularly if a statistically valid verdict on efficacy is required. Such assessments are at present based above all on qualitative comparisons. The serological response which can be measured in important sample groups of the population has raised the question of the interference of enteric viruses with the poliovirus and of interference between the polioviruses themselves. This is a subject for wider research. The spread of vaccine viruses in communities partially immune before vaccination which is slower than in non immune communities is still a matter for study. However imperfect the trials of the live vaccine made so far nothing has arisen to suggest that it is not harmless or to throw doubt on its effectiveness once the organism has responded by producing antibodies and excreting viruses.

LIVE POLIOVIRUS VACCINATION IN THE USSR, POLAND AND CZECHOSLOVAKIA

Live poliovirus vaccination has already been practiced on a large scale in the USSR, Poland and Czechoslovakia. With the agreement of the ministries of health in these three countries WHO invited Dr Dorothy Horstmann, Associate Professor of Preventive Medicine and Pediatrics at the Yale University School of Medicine, USA, to visit these countries between August and October 1959 and evaluate the results of the mass vaccination programmes carried out with the live vaccine. She spent most of the time at her disposal in the USSR and a week each in Poland and Czechoslovakia.

The USSR

Some 15 million persons were vaccinated in the USSR by the end of January 1960 and it is planned to vaccinate another 60 million by the end of the year i.e. practically the entire population under the age of 20.

Striking features of laboratory work in this

country are, in Dr Horstmann's view, the large staff available and the high standards of sterile technique. The methods used for preparing tissue cultures and for the determination of neutralizing antibodies are similar to those used elsewhere and the laboratory work is of good quality. Some delay seemed to her to occur in the carrying out of tests and particularly in the isolation of virus from cases due mainly to the large number of specimens collected from areas scattered through vast tracts of country and to the absence of staff on expeditions to republics starting vaccination programmes.

The decision to undertake the vaccination programme was delayed for several months pending detailed study of the problem by the Ministry of Health and when permission to start was given the vaccine was offered to the republics to use or not as they wished. There had been an epidemic of poliomyelitis in Estonia in 1958 and possibly for this reason this republic was the first to ask for the

vaccine. The success of the programme in Estonia set off a "chain reaction" throughout the other republics and at the time of Dr Horstmann's report only one republic had not asked for the vaccine.

The vaccine which is prepared from the three strains developed by Sabin was administered serially to begin with first type 1 then type 3 then type 2.¹ In Lithuania groups vaccinated serially in this way were compared with groups vaccinated with a triple vaccine either once or twice and when the preliminary results showed that there was no significant difference in the two methods triple vaccine became the only one used. In Georgia the administration of triple vaccine to children in sweetmeats is being tried.

The vaccination campaign begins by enlisting the co-operation of the doctors and the public. The directors of the programme assemble the doctors and explain the organization of the programme, the role of the doctors, their responsibilities during the campaign and afterwards, and the importance of close surveillance. Radio and television broadcasts, newspapers and posters bring the aims of the campaign before the public to persuade it of the advantages of co-operation. An important town in each region is selected as a centre. To it is sent frozen vaccine sufficient for several days of vaccination and from it teams go out daily carrying the vaccine in iced thermos flasks. In the rural areas these teams each consist of a medical auxiliary with some medical training (called a "feldscher") and two nurses. In the towns teams are set up in schools, nurseries, kindergartens and out-patient departments and a physician supervises the work of several teams. Data are recorded on every person vaccinated.

This is the system generally used but there are slight variations between the republics. There are no control groups and no selection of persons for vaccination other than by age, for this is meant to be a mass vaccination programme, not a controlled trial of a new kind of vaccine for poliomyelitis. As in other mass campaigns an indefinite number of people have been missed being absent ill or reluctant to face vaccination but this

number was reduced by a continuous vaccination programme through the summer of 1959. Accurate population data have made the planning of the campaign much easier.

Before the vaccination began serological surveys were made to determine the immunity status of the population. The children surveyed in the age group 0-3 consisted only of those living in nurseries or staying in them during the day, a group which Dr Horstmann does not think representative of the population at large. The survey of the age group 4-7 also drew too heavily on children in institutions and in kindergartens. The group 7-14 consisted mainly of schoolchildren and the adults surveyed were mainly factory workers. This survey work has been held up by difficulties with the colorimetric neutralization test but these have been overcome.

Surveillance is efficiently carried out. In each area the vaccination teams are also surveillance teams. In Tashkent for example where the vaccine was given during an epidemic every home was visited every 5-6 days from mid July to mid September 1959 to check on possible cases. Generally however the local paediatrician notifies a case to the area sanitary and epidemiological station which send an epidemiologist to the child's home to make a thorough inquiry into the case and its contacts. The Ministry of Health in Moscow has set up a special notification system for cases of poliomyelitis and all suspicious cases (that is all with acute infection of the central nervous system) are sent to hospital for confirmation of the diagnosis and treatment. Dr Horstmann considered that it was most unlikely that any paralytic cases would be missed under this system.

Since there are no controlled trials the 1959 incidence of poliomyelitis in vaccinated and unvaccinated persons cannot be compared. But the overall incidence in comparison with the previous five years showed a marked fall in 1959. Some of the republics attribute part of this fall to vaccination with the Salk vaccine but this vaccine has not been extensively used.

Dr Horstmann concludes that the attenuated live vaccines used appear to have been safe both to those vaccinated and to the

¹For further details on this vaccine and its effects see page 138

communities in which they live for at least the six month period during which surveillance was carried out. The fall in the number of cases suggests that the vaccine is effective although the absence of a controlled trial makes it difficult to gauge its effectiveness accurately.

Poland

Until 1951 poliomyelitis was sporadic in Poland and of little importance. An epidemic occurred in that year with an attack rate of 12.2 per 100 000 and an epidemic in 1958 had an attack rate of 21 per 100 000. Cases have been confined to the lower age groups approximately 70% have been in children under 4 years of age 95% in children under 8.

Vaccination with the Salk vaccine was begun in 1957 and in 1958 after the epidemic extended to most children under 7. In October 1958 vaccination with the Koprowski live poliovirus vaccine was begun on a small scale. Mass vaccination with this vaccine was begun in June 1959 and by the time Dr Horstmann wrote her report nearly a million children had been vaccinated with types 1 and 3. The aim is to vaccinate the entire population with these two types and for the moment to ignore type 2. Children who have had two doses of Salk vaccine receive a booster dose of live vaccine.

As in the USSR the health services are well organized and surveillance efficient. Vaccina-

tion is compulsory and if parents fail to bring their children they are heavily fined. The immunity status of the population is studied before the vaccine is administered. Dr Horstmann points out that because the population is relatively small accurate information should be available soon on the safety and effectiveness of the vaccine.

Czechoslovakia

In 1957-1958 vaccination was extensively carried out. Salk vaccine being used. Sabin live vaccine has now been given to children who had three doses of Salk vaccine and the trial is being well controlled. The standard of work in the laboratories in Czechoslovakia is high, epidemiological services are good and surveillance is being carefully carried out. The incidence of poliomyelitis was extremely low in 1959.

Serological surveys were made before and after vaccination with the Salk vaccine and before vaccination with the Sabin vaccine and the series is being completed with a post Sabin survey. The prevalence of poliovirus infection is assessed at intervals of 3-4 months by sampling the population under 5 years of age in both vaccinated and non vaccinated areas. The results from the samples taken 5½ months after vaccination with the oral vaccine show that there is no significant difference between the amount of poliovirus circulating in the vaccinated regions and that in the rest of the country.

Yaws and standards of living

It is at least suggestive that one of the main factors reducing yaws prevalence may be more water and more soap. This statement by Dr C. J. Hackett, Medical Officer, Venereal Diseases and Treponematoses, WHO Headquarters, appears in an article on epidemiological aspects of yaws eradication which will shortly be published in the WHO Bulletin. The article explains:

"A great reduction in the prevalence of yaws not attributable to a mass treatment campaign is usually accompanied by other changes that have contributed to the raising of the standard of living. The more obvious of these are more and better clothing, more bicycles on the roads, more village schools and more secondary school places, more dams, boreholes and wells available and in use, and more soap—all of which are signs that the community is wealthier. However, village houses may be in no better state of repair and excreta disposal may still remain a matter of individual action."

COLLECTIVE ANTIBIOTIC TREATMENT OF TRACHOMA

By the early nineteen fifties it was clear from numerous reports that certain of the broad spectrum antibiotics were effective against trachoma. It seemed however that treatment would have to be continued over long periods to cure the average case. With help from WHO and UNICEF comparative trials have been conducted in Morocco since 1954 to assess the value of local treatment of trachoma with chlortetracycline and to develop much needed simple and economic methods of treatment suitable for mass campaigns. These trials were on a scale unprecedented in connexion with the disease covering more than 9000 schoolchildren with active trachoma. They are reported on by J Reinhardt, A Weber & F Maxwell Lyons in an article which recently appeared in the WHO Bulletin¹ and which is summarized below.

Marrakech was the first large town in Morocco where all trachomatous school children were given collective treatment with antibiotics. The schedule of treatment was that recommended in the first report of the WHO Expert Committee on Trachoma—a local application of chlortetracycline in the form of a 1% ointment three times daily for 60 consecutive working days (five days each week). Some 3800 schoolchildren were treated in this way at the beginning of 1954. The results of this first treatment, observed seven months later, were as follows:

56.9% of the children were clinically cured
33.6% showed appreciable improvement and were probably cured (these cases were classified as "Category X" pending further observation)

9.5% still showed signs of active trachoma

During the next school year the remaining active cases received further treatment, this time with sulfonamides being administered as well as chlortetracycline ointment. Following this

treatment only 1.6% of the total number of children treated were still uncured. It was also found that the great majority of the "Category X" cases had been cured by the first treatment.

In the school year 1955-56 a comparative trial of three schedules of treatment was carried out in Meknes. They were:

Schedule 1—Application of 1% chlortetracycline ointment three times daily for 60 consecutive working days

Schedule 2—Application of 1% chlortetracycline ointment twice daily for 60 consecutive working days

Schedule 3—Application of 1% chlortetracycline ointment twice daily on three consecutive days, repeated every four weeks over a period of 20 weeks, i.e. six three-day cycles of treatment

A total of 4136 children, divided into three distinct but comparable groups, were treated. The results given by each of the three schedules were remarkably similar in relation to stage and severity of the disease, age group and social and economic level. Nor was there any appreciable difference between the results in respect of the degree of cicatrization after cure and the relapse rate ascertained a year after treatment ended.

In 1957-58 intermittent short term treatment was again tried out, this time in the rural schools of the Province of Tiznit (southern Morocco). In this part of the country secondary infections are more prevalent and general living conditions are on a lower level than in the northern towns. Treatment schedules 2 and 3 were applied to two groups containing a total of 1167 children. As at Meknes no appreciable difference was observed between the results of continuous treatment and those of intermittent treatment.

In none of these trials was an evaluation of results made until a follow up period of four to seven months after the termination

¹Bull. Wld Hlth Org. 19:9:21, 665

Wld Hlth Org. Wkly Rep. Ser. 19:4:5

of treatment. In addition further examinations took place between twelve and eighteen months after the end of treatment to detect late relapses or errors of diagnosis.

The main results of the trials may be summarized as follows. The application of chlortetracycline resulted in the clinical cure of 57.80% of trachoma cases among the Moroccan children thus treated, the rate depending on the stage and severity of the disease and on the living conditions of the communities involved. Even in the more resistant cases a very high proportion of cures was obtained after a second course of treatment. It would appear that relapse and reinfection rates are relatively low in school children at least in the urban districts of Morocco. Clinical evidence was collected to the effect that after appropriate treatment with antibiotics fine papillary hypertrophy associated only with scars is not to be considered as a sign of persistent activity of trachoma. Finally intermittent short term treatment was found to be as effective as the treatment schedule originally recommended in the first report of the WHO Expert Committee on Trachoma.

The authors suggest the following explanation of the effectiveness of intermittent treatment. The trachoma virus is probably most

susceptible to antibiotics during or soon after the phase of multiplication. The three-day treatment cycle may be enough to eliminate all virus particles which have reached this stage but not those which are in an inactive state at the time of application. Thus short treatment cycles repeated at appropriate intervals should eventually eliminate the virus.

Whatever the explanation the intermittent method proved extremely effective in the treatment of trachoma in Morocco. More over preliminary reports of trials in other countries confirm the finding that there is little difference between the results with this method and those with the old continuous treatment method. The use of intermittent treatment makes for great economy in antibiotics and in staff and other campaign expenses thus permitting a wide expansion of mass treatment programmes.

The authors recognize that the minimum requisite treatment of trachoma with antibiotics may vary from country to country and that factors such as irregular attendance may impose a treatment cycle of more than three days. They recommend that well-controlled trials be carried out in each country to determine the schedule of treatment most appropriate to local conditions and needs.

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958 *

9 Levels of living

In 1952 the United Nations General Assembly requested its Economic and Social Council to provide for the working out of adequate statistical methods and techniques so as best to facilitate the gathering and use of pertinent data in order to enable the Secretary General to publish regular annual reports showing changes in absolute levels of living conditions in all countries. The Secretary General

convened a committee of experts to report on the definition and measurement of standards of living. This committee which preferred the use of the term *levels of living* for actual living conditions leaving the term *standards of living* to cover future aspirations was unable to formulate a single index of the level of living but concluded that the most satisfactory approach to international measurement of levels of living would be through the measurement of clearly delineated aspects or parts of the total life situation.

that are amenable to quantification and reflect international aims.¹ Statistical measurements were to be sought therefore for twelve components of levels of living which the committee considered would form a satisfactory international catalogue of such aspects. Of these twelve components "health including demographic conditions" was placed first.

The United Nations Statistical Commission discussed the committee's report and recommended that the specialized agencies each in its own field examine the adequacy of the indicators proposed by the committee as well as the availability and accuracy of the statistics relating to such indicators. In pursuance of this recommendation a WHO Expert Committee on Health Statistics² examined the indicators proposed by the United Nations committee for the component "health including demographic conditions". These indicators are (a) expectation of life at birth (b) infant mortality rate (c) crude annual death rate (d) number of hospital beds in relation to the population and (e) number of physicians in relation to the population. Each of these indicators in the Expert Committee's opinion has its disadvantages. The expectation of life at birth is affected significantly by the infant mortality rate; the accuracy and reliability of which are questionable in many territories of the world because of incomplete registration. Moreover indices of expectation of life are themselves not available in many countries especially in under developed ones. The crude death rate is of limited value because of the influence of the sex and age structure of the population. There is no international comparability of quality of medical care facilities so that the number of hospital beds and of physicians would not show how well equipped the hospitals are nor how competent the physicians. In any case hospitals and physicians tend to be concentrated in urban areas in some countries so that urban levels of medical care are higher rural level correspondingly lower.

The Expert Committee reviewed other possible indicators such as the number of deaths from infectious diseases in relation to all deaths the number of deaths under five years of age in relation to deaths at all ages and the use of morbidity statistics. However it felt that in view of the complex nature of the issues involved further studies of these were required.

In October 1955 WHO convened a Study Group on the Measurement of Levels of Health³ which included among its members statisticians public health experts a social scientist and an anthropologist.

The Group was confronted with two questions: what can be done with available health statistics as indicators (perhaps suitably refined) and can any new indicators be suggested?

In the opinion of the Group health indicators might be classified in three categories: (a) those associated with the health status of persons and populations in a given area (vital statistics nutrition etc.) (b) those related to physical environmental conditions having a more or less direct bearing on the health status of the area under review and (c) those concerned with health service and activities directed to the improvement of health conditions (availability and use of hospitals physicians and other health personnel).

The Group reviewed the sources available to the health administrator for measuring levels of health such as vital and health statistics epidemiological information and data from surveys. None contains satisfactory specific indicators of health from the threefold aspect of physical mental and social well being. Nor are the techniques for measuring the level of morbidity sufficiently advanced to provide a satisfactory indicator. Mortality statistics however for all their limitations have the merit of availability both from one period to another and from one country to another.

The Study Group discussed the concept of health and possible indicators of health. These might be roughly divided into those

¹ United Nations Statistical Commission, *Report on the work of the Commission for 1954*, New York, E.C.N. 3/1954, p. 10.

² WHO Expert Committee on Health Statistics, *Report*, Geneva, 1955, p. 133.

³ WHO Study Group on the Measurement of Levels of Health, *Report*, Geneva, 1955, p. 133.

of treatment. In addition further examinations took place between twelve and eighteen months after the end of treatment to detect late relapses or errors of diagnosis.

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The authors recognize that the minimum requisite treatment of trachoma with antibiotics may vary from country to country and that factors such as irregular attendance may impose a treatment cycle of more than three days. They recommend that well controlled trials be carried out in each country to determine the schedule of treatment appropriate to local conditions and needs.

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convened a committee of experts to report on the definition and measurement of standards of living. This committee, which proposed the use of the term "levels of living" to describe actual living conditions, leaving the standards of living to cover future aspirations, was unable to formulate a final index of the level of living, but concluded that the most satisfactory approach to the international measurement of levels of living would be through the measurement of clearly defined aspects or parts of the total life situation.

TRAINING OF PERSONNEL FOR MALARIA ERADICATION

International staff

The malaria eradication programme of the World Health Organization covers almost 100 projects. In these the Organization's most important participation is the provision of experts to give technical advice in various branches of malaria eradication. In addition senior specialists are employed in the Organization's six Regional Offices and in the Malaria Eradication Division in Headquarters.

The number of staff authorized for the whole programme is about 390 including medical officers entomologists engineers sanitarians laboratory technicians and administrative officers as well as chemists biologists parasitologists statisticians health educators transport officers etc.

As the demand for personnel experienced in malaria work far exceeded world supply it was found necessary to recruit a number of persons with suitable basic qualifications and to give them training in the modern malaria eradication techniques adopted by WHO.

For this reason training courses were instituted in various centres all over the world. So far more than 200 people have been trained in the following centres: Kingston (Jamaica) Maracay (Venezuela) Mexico City (Mexico) São Paulo (Brazil) Tala (Philippines) Delhi (India) Addis Ababa (East Africa) Cairo (United Arab Republic) Guatemala Amsterdam (Netherlands) Basle (Switzerland) London (England) and Rome (Italy). Courses have been held in Spanish Portuguese English and French.

Some of these centres like those in London Amsterdam Delhi Rome and Basle are internationally known training institutes where courses have occasionally been held for the training of groups of WHO staff while others such as those in Kingston Maracay Mexico City São Paulo Tala and Cairo are specialized malaria training centres where courses are regularly held for both international and national staff in most cases with the help of WHO. WHO frequently

provides some equipment supplies and transport and contributes teaching and administrative staff. A number of other centres will be encouraged to take part in the programme in the near future to help meet the increasing demand for trained malaria staff.

Candidates for international recruitment are carefully selected with due regard to their background. Other conditions being equal preference is given to those who already have some knowledge of or training in malaria work experience of tropical life and knowledge of English or French or both.

The basic qualifications required for the various categories of staff are as follows for medical officers a degree in medicine and a diploma in public health or tropical medicine and hygiene (or both) or long experience in public health activities for entomologists a degree in science (entomology) with a diploma or training in medical entomology preferably malaria entomology for engineers a degree in civil engineering with a diploma in public health or sanitary sciences (or both) for sanitarians a diploma in sanitation or the equivalent with experience in public health work (preferably antimalarial work) for laboratory technicians a diploma in medical technology or its equivalent with several years experience of laboratory work preferably with some knowledge of haematology and entomology applied to malaria.

The selected candidates are sent to the training centres to learn the latest techniques advocated by WHO for malaria eradication programmes. At the end of the course which may last from one to three months according to the category of staff the trainees come to Geneva and are given an examination. Those who pass are offered contracts generally for two years and are sent to field teams for a period of in-service training. Each successful candidate is given full responsibility in a programme as soon as a satisfactory appraisal of his performance is obtained from his supervisor.

In the Americas trainees are usually sent after the theoretical part of the course to

based on available statistics and such new ones as might be devised. Among the former there are comprehensive indicators such as the expectation of life and the crude death rate and specific indicators such as infant mortality deaths from communicable diseases per 100 000 population and indicators of health services and activities. Among the latter might be considered the percentage of population receiving a protected water supply or the percentage having facilities for proper disposal of excreta or indicators measuring the status of mental health, nutrition and housing (as seen from its health aspect). The group weighed up the merits and demerits of each of these indicators and concluded that further information was required. It accordingly recommended that special sampling surveys be undertaken of morbidity, nutrition, mental health, environmental factors, health services and social and economic conditions.

In its discussions the Study Group considered the proportional mortality ratio (the number of deaths at ages 50 years and over as a percentage of total deaths) as a possible comprehensive indicator of health. In the view of the Study Group this indicator—which was devised by WHO⁴—was a promising one because the primary data are comparatively easy to collect and the method of construction is straightforward. It felt however as did the authors themselves that further critical studies would be necessary before it could be definitely accepted. The proportional mortality ratio has now been further tested by its authors who have produced statistical evidence to show that it satisfies certain essential conditions. These are records should be available from as large a number of countries and territories as possible, the indicator should be related as far as possible to the country as a whole, not just to a selected area or population group, the records needed for its estimation should

not be unduly affected by such defects as under registration or differences in terminology and the indicator should be of a comprehensive character simple enough to command acceptance internationally and sufficiently discriminating to distinguish between countries at various levels of health. In spite of some weaknesses they therefore concluded that it is the most suitable indicator of health including demographic conditions.

The fifth⁵ and sixth⁶ reports of the WHO Expert Committee on Health Statistics briefly reviewed contributions to the development of indicators of health levels. They reiterated the opinion that theoretically the expectation of life at birth, at 1 year or at any other age is the best indicator of all, but admitted that it is available for only a small number of countries and even then at infrequent intervals. The best practical comprehensive health indicator suggested hitherto is the proportional mortality ratio and the Expert Committee accordingly recommended that it be explored on an experimental basis until its usefulness can be judged in the light of experience. Referring to specific indicators the Committee emphasized the value of the infant mortality rate and in particular the late infant mortality rate (from 1 to 11 months) because the latter is less influenced by pre-natal and intrapartum causes of death. The total death rate in the 1-4 age group was also suggested for trial as a specific indicator where accuracy of age recording justifies its use. A choice has to be made between a series of indicators which fulfil to different degrees the criteria of statistical significance and of availability. It is to be hoped that the work initiated by ILO and WHO on family living studies and family health surveys will provide valuable data which in future can be used for the measurement of levels and trends in health.

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For this reason training courses were instituted in various centres all over the world. So far more than 200 people have been trained in the following centres: Kingston (Jamaica), Maracay (Venezuela), Mexico City (Mexico), São Paulo (Brazil), Tala (Philippines), Delhi (India), Amani (East Africa), Cairo (United Arab Republic), Guatemala, Amsterdam (Netherlands), Basle (Switzerland), London (England) and Rome (Italy). Courses have been held in Spanish, Portuguese, English and French.

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provides some equipment, supplies and transport and contributes teaching and administrative staff. A number of other centres will be encouraged to take part in the programme in the near future to help meet the increasing demand for trained malaria staff.

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In the Americas, trainees are usually sent after the theoretical part of the course to

visit malaria eradication programmes in operation in the Region e.g. in Mexico Venezuela Brazil El Salvador Guatemala etc. In other parts of the world programmes such as those in Syria Lebanon Iraq and China (Taiwan) are also being used for field visits

It is expected that a number of candidates in the various categories mentioned above will still be required in the future in malaria eradication programmes and the Organization is still actively looking for suitably qualified people. Apart from the technical criteria that have to be satisfied in the selection recruitment training and posting of the candidates there is also the aptitude to become an international civil servant without which the task in the field cannot be satisfactorily performed however high the candidate's qualifications and however wide his experience.

National staff

A number of qualified and trained personnel are necessary to the success of any malaria programme. While it is generally not difficult to recruit such categories of staff as spraymen and it is still relatively easy to recruit and train squad leaders it is becoming increasingly difficult to find and train staff of a higher level including persons to serve as directors of various departments in the national malaria service and in the very important key position of director of the service itself. Engineers entomologists parasitologists administrators health educators epidemiologists etc. are required.

In a number of countries it is possible to find people sufficiently qualified to fill these positions in their national eradication services after further specific training. In other countries however people with the required basic qualifications are not available at all.

Advanced training in specific branches of malaria is offered to national staff by WHO in the form of fellowships: a number of fellows are sent to the training centres mentioned above where the latest techniques adopted in malaria eradication programmes are demonstrated. Training of national staff is also provided for by WHO malaria country advisers. The Organization also sponsors tours and visits of national malaria staff members to other malaria programmes to observe certain aspects of field operations. In some countries training courses are organized with the help of specially recruited WHO consultants. The Organization has recently arranged for consultants to visit existing training institutions in certain countries with a view to developing them into permanent malaria training centres to serve a number of countries in the same region.

In reviewing and appraising the results of a number of malaria eradication programmes it has been clearly brought to light that the lack of trained national staff is frequently the cause of failure in the correct implementation of field operations and that therefore no success can be foreseen if national services are not adequately staffed both in quantity and quality. WHO is therefore paying increasing attention to this aspect of malaria training.

Finally there are the malaria conferences seminars and symposia frequently organized or assisted by WHO. Such meetings give malaria workers of various countries the opportunity to exchange ideas and benefit from the experience of others. Under the programme of exchange of scientific workers the Organization invites a number of national malaria workers of a high level to visit malaria eradication programmes in other countries so that they may exchange ideas and discuss experiences with local malaria officials on the spot.

Opportunities for training in malaria work

Medical and technical personnel interested in taking part in malaria eradication work in any of the categories mentioned in the above article are invited to write to the Chief of Personnel, World Health Organization, Palais des Nations, Geneva, Switzerland, quoting the reference: WHO Chronicle (April 1960).

EXECUTIVE BOARD TWENTY FIFTH SESSION

The Executive Board of WHO met from 19 January to 1 February 1960 in Geneva under the chairmanship of Professor E. J. Y. Aujaleu (France). The Vice Chairmen were Professor N. Etemadian (Iran) and Dr M. M. Penido (Brazil). Dr D. Castillo (Venezuela) and Dr A. J. Metcalfe (Australia) were Rapporteurs. A wide range of technical, financial and administrative items were discussed. Certain questions of general interest are reviewed below.

Programme and budget for 1961

The Board unanimously recommended the adoption by the World Health Assembly of a working budget of \$18 569 620 for 1961. This represents an increase of about 10% over the figure for 1960, reflecting the growth of the Organization's activities, particularly in the eradication of communicable diseases, medical research, the improvement of environmental sanitation and the education and training of health personnel.

Medical research

A report to the Board on the general development of the intensified medical research programme was based on the recommendations of the WHO Advisory Committee on Medical Research, composed of a number of eminent scientists, each a recognized authority in his field. The subjects dealt with were malaria, tuberculosis, treponematoses, leprosy, onchocerciasis, bilharziasis, virus diseases, insecticide resistance and vector control, veterinary public health, antibiotics, cancer, cardiovascular diseases, radiation and genetics, and biological standardization. It was recommended that priority be given to services to research such as the standardization of nomenclature, techniques and equipment to ensure comparable results in different parts of the world, setting up reference centres for the identification of micro organisms,

tissues etc., improving the training of research workers and communications among them. Next in priority would come demographic studies into the varying incidence or prevalence of diseases and international co-ordinated research programmes that might have a bearing on major WHO programmes. The Board noted these priorities and expressed its satisfaction with the proposed research programme for 1960 and 1961.

The Board considered a United Nations resolution on the international encouragement of scientific research into the control of cancerous diseases through the award of prizes for outstanding work in this field. The Director General was asked to study with the Secretary General of the United Nations the best way in which to award prizes, but in the light of the world wide study made by WHO in connexion with the intensification of its medical research programme, the Board doubted whether awarding prizes was the most suitable means of encouraging medical research.

Malaria eradication

An interim report was presented on the development of the world wide malaria eradication programme. A more comprehensive report of progress in 1959 will be submitted to the Thirteenth World Health Assembly. Judging by the number of campaigns planned or in operation, the programme was progressing satisfactorily. Eradication operations were under way in 65 countries and territories and 33 countries and territories had realistic plans for initiating them. Many hundreds of millions of persons were profiting from antimalaria activities and the disease had been eliminated from a number of countries and territories where it was previously a health problem. There was need however for improvement in the quality of the administrative and technical services of some individual programmes. The Board therefore

urged the governments concerned to take the necessary steps for the training and provision of adequate technical and administrative personnel for the more effective prosecution of their eradication programmes and asked national health authorities to strengthen the supervisory and epidemiological assessment activities of their malaria eradication services

As of 18 January the Malaria Eradication Special Account fell short by \$1 300 000 of the amount required to finance the Organization's share in malaria eradication operations during 1960 a further \$6 400 000 was required for operations in 1961 During the session of the Board new contributions of 1 000 000 roubles (\$250 000) in supplies and services from the USSR and A£15 000 (\$35 000) from Australia were announced It was also hoped that a contribution of DM1 000 000 (\$238 000) would shortly be forthcoming from the Federal Republic of Germany In addition the Government of Norway was prepared to make an initial contribution of \$100 000 as soon as WHO could confirm that a sufficient number of other Member States would contribute relatively equivalent sums Subsequently the Government of Canada notified its intention to seek the approval of Parliament for a contribution of US \$100 000 the Government of Indonesia contributed \$10 000 the Government of Tunisia \$2000 and the Government of Denmark notified its intention of contributing Kr 1 000 000 (\$144 780) under conditions similar to those formulated by the Norwegian Government The Board considered that continuing efforts should be made to finance the malaria eradication programme on a voluntary basis and hoped that the economically more advanced countries would make substantial contributions to the fund The attention of Member States was called to the need for support from individual governments in the effort to obtain contributions from industry and the general public

BCG vaccination

A second evaluation report on BCG vaccination activities was presented to the Board in

compliance with a resolution of the previous session The conclusion drawn from this evaluation was that there was ample justification for the mass scale use of BCG vaccination in the control of tuberculosis even though it had been impossible to assess the exact part played by the vaccine in the reduction of morbidity and mortality from the disease owing to among a number of factors the simultaneous employment of other control measures The Board recommended that WHO continue to assist in the integration of BCG vaccination programmes with national tuberculosis control programmes and to study ways and means of evaluating the protective value of BCG vaccination

Protection against radiation hazards

On the advice of one of the Sub-Committees of the Regional Committee for the Eastern Mediterranean the Board examined the problem of the health implications of the atomic tests During the discussions on this subject some members of the Board stated that the Organization as a health agency had a great responsibility for the protection of man against possible damage from ionizing radiations whatever their source Some others recalled that the largest source of exposure at the present time is from X ray and similar apparatus The Board asked the Director General to study the preventive aspects of reducing radiation hazards and present a report on the subject to the Thirteenth World Health Assembly and included in the provisional agenda of the Assembly an item Radiation health including protection of mankind from ionizing radiation hazards whatever their source

Disarmament and funds for health

The Board considered a resolution on general and complete disarmament unanimously adopted by the United Nations General Assembly and recommended that the Thirteenth World Health Assembly appeal to Member States to devote part of the funds which might be released by the implementation of this resolution to their health budgets

"so as to improve the health of their population mainly through the control of the most widespread diseases which claim large numbers of lives" It was also recommended that the Health Assembly ask the Director General to submit to the Executive Board as soon as agreement had been achieved on general and complete disarmament proposals for the use of any resources resulting from such an agreement to meet urgent needs in the field of health

Voluntary Fund for Health Promotion

It was recommended to the World Health Assembly that existing special accounts with the exception of the Malaria Eradication Special Account should be amalgamated into a single fund to be known as the Voluntary Fund for Health Promotion This fund will include sub-accounts for smallpox eradication medical research and community water supplies During the session a donation of \$300 000 for the community water supply programme was announced by the Government of the United States of America

Co-operation with UNICEF

The Board reviewed a report on activities jointly assisted by WHO and UNICEF It noted with satisfaction that the UNICEF Executive Board had decided to continue support of the malaria eradication programme up to a ceiling of \$10 million a year and to broaden its criteria for assistance to this programme and expressed its satisfaction with the continuing close and effective collaboration between the two organizations

World Health Year

The views of Member States and of the Regional Committees on the proposal to hold an International Health and Medical Research Year (or World Health Year) were reviewed by the Board The Director General was asked to make further efforts to obtain opinions on this subject from the considerable number of Member States which have not yet given them It was suggested that the

Thirteenth World Health Assembly in reconsidering the matter should provide for further study on the following points the potential for health progress inherent in the idea and the aims organization programme timing financing etc of the proposed activity

Headquarters accommodation

The Board was informed of developments in connexion with the proposed new Headquarters building in Geneva The site of the building—near the Palais des Nations Geneva—has been placed at the disposal of the Organization by the authorities of the Republic and Canton of Geneva who have also granted a loan of Sw frs 10 000 000 towards the cost of the building the interest to be borne equally by the Canton and by the Organization In addition the Swiss Parliament has unanimously authorized an interest free loan to WHO of Sw frs 20 000 000 for financing the construction of the new building

Fifteen architects or architectural firms throughout the world have been asked to take part in the international competition for plans for the new building and all have accepted The competition is to close on 14 April 1960 and it is hoped to announce the results at the Thirteenth World Health Assembly

WHO flag

The Board agreed to recommend to the Thirteenth World Health Assembly that an official WHO flag be adopted to be flown on the premises of the Organization and to be displayed elsewhere on ceremonial and other appropriate occasions It was recommended that the design of this flag be based on the official emblem of the Organization with or without modification

Fourteenth World Health Assembly

It was decided to recommend to the Thirteenth World Health Assembly that the invitation of the Government of India to hold the Fourteenth World Health Assembly in New Delhi in 1961 be accepted

Epidemiological and Statistical Information

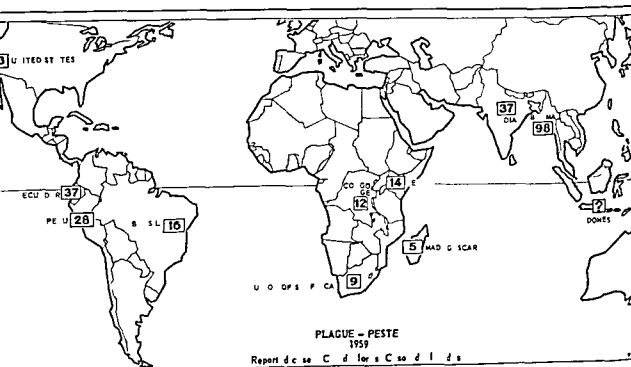
PLAGUE IN 1959

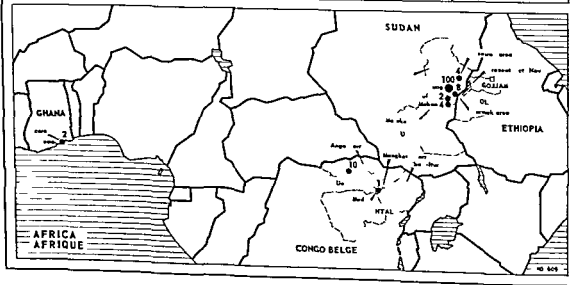
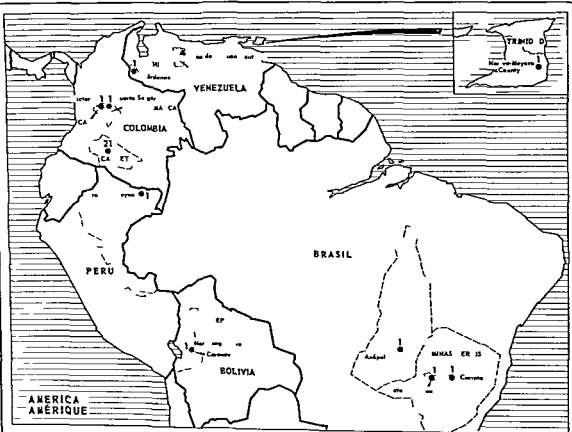
According to a recent number of the WHO *Weekly Epidemiological Record* (No 4 1960) the world incidence of plague in 1959 was as low as in 1958 less than 300 cases of human plague were officially reported in ten countries of Africa America and Asia (excluding continental China) However the occurrence of accidental single cases (United States of America and Madagascar) and of small foci in areas which were apparently free from human cases for one or more years (northern India Union of South Africa) indicates that the infection is still maintained among rodents in wide areas of the three continents

In Africa cases were reported in the two areas which also notified cases in 1958 namely the north eastern part of the Belgian Congo and the Central Province of Kenya In the Union of South Africa an outbreak was reported in a district from which plague had apparently been absent since October 1957

In America there were active foci in Ecuador and Peru In Brazil the disease was notified only in one area of the State of Bahia Three single cases were notified in California and New Mexico in the United States of America

In Asia Burma notified the highest number of cases (98 including 36 in four inland urban areas)





In Africa the presence of yellow fever was reported in an area where clinical cases had not been observed so far the eastern part of the Sudan and neighbouring districts of Ethiopia. Altogether 118 cases and 87 deaths were recorded in this area. Eleven cases occurred during the year in the northern part of the Belgian Congo and 2 in Ghana (see map on preceding page).

Official notifications in 1959 account for 31 cases of jungle yellow fever in America (as compared with 66 in 1958) including 23 in Colombia 3 in Brazil 2 in Trinidad (free from yellow fever since 1954) and single cases in Bolivia Peru and Venezuela (see map). The presence of yellow fever virus in a vertebrate other than man (i.e. in a monkey) was demonstrated in Venezuela.

The above information is taken from the WHO *Weekly Epidemiological Record* (No 5 1960)

Reports of Expert Groups

Epidemiology of mental disorders *

In the past psychiatry was primarily concerned with the individual. Towards the end of the nineteenth century, however, certain psychiatrists began to study mental disorders as mass diseases, concentrating at first on the genetic aspects of mental illness, but gradually taking environmental factors into account. Today it is realized that the prevention of mental disorder must be based on accurate knowledge of prevalence and incidence, i.e. that an epidemiological approach is required.

The eighth report of the WHO Expert Committee on Mental Health¹ reviews the uses of this approach in psychiatry and the most suitable methods for the different types of investigation involved

The epidemiological approach in psychiatry can be used for two main purposes which are to a certain extent inter related (a) to elicit facts about treated and untreated disease which are needed for the intelligent administration of community psychiatric services (operational research) (b) to discover those aspects of the habits environment or organization of human populations which may affect the onset or course of mental disorders and to assess their relative importance (clinical research) Since mental disorders differ in certain respects from other illnesses their epidemiological investigation presents a number of special problems Thus there are factors in psychiatric diseases which because they belong to the sphere of values cannot be fully quantified Moreover the etiology of mental disorder is more complex than that of most other types of illness while there are considerable differences between various cultures in what is considered mentally abnormal

One of the basic requirements of epidemiology is a generally accepted system of statistical classification which will allow data obtained by various investigators to be com-

WHO Expert Committee on Malaria (1960) Eighth
Report on the Epidemiology and Control of Malaria (WHO
Publications, 1961, No. 10) p. 30. Sw. 1.1—

Members of the Committee Dr S Besh 1 D E
 Est Moll Sw d Dr A H Leht USA (Rapport u)
 Dr Ts gy Lin Ch n (R pporteur) D O Od gaa d
 N way (Ch rman) Dr P D S d Fanc Dr E S gel
 d, gndom (Sec rary) D J Vyncke Belg Co go
 Sec rary D B kl WHO Reg al Office f r e op
 Dr E. E. h pf Wfco (Sec rary) D T g J M h WHO
 R pporteur f the E tern Med terr D J S Pet ro
 WHO Dr M n Pf rter WHO Dr D R d, Un ted k, gdom
 (Co lt t)

pared. The lack of such a classification has repeatedly defeated attempts at comparing psychiatric observations and results of treatment not only internationally but within one and the same country. Section V of the International Classification of Diseases Injuries and Causes of Death which deals solely with mental disorders has been ignored or rejected in most countries in fact it has been widely used only in connexion with the classification of causes of death. The Committee agreed that to be generally acceptable a classification of mental disorders should use non controversial concepts which are communicable in unambiguous terms and thus make for a high degree of comparability.

In view of the inadequacy and selective nature of most readily available mortality and morbidity data relating to mental illness special surveys are nearly always essential in order to assess the needs for psychiatric care in an area and the genetic environmental and other circumstances which may precipitate the onset of such illness. The report reviews the problems of obtaining representative samples of case finding and of the standardization of psychiatric diagnosis in

field surveys. The most standardizable countable and comparable units of observation in psychiatry appear to be symptoms such as anxiety depression paranoid trends excitement delusions hallucinations and intellectual dullness. A list of such symptoms should therefore be established together with a glossary and examples to make their meaning as clear as possible. Data could then be gathered from the population under study regarding the number kinds and time of onset of these symptoms and subsequently classified into syndromes and recognizable diagnostic entities such as pre senile psychosis schizophrenia or manic-depressive psychosis.

In both operational and clinical research in the field of mental illness the most pressing need is for the development of suitable technical methods and concepts. The Committee considered that there is a place for the deliberate controlled or designed experiment in the investigation of the etiology of mental disorder. Advantage might be taken of "experiments of opportunity" to observe the incidence of mental disorder among populations whose way of life has been radically altered by some act of nature or human activity beyond their control (e.g. disaster victims refugees etc).

Appraisal of fellowships *

During the past decade a vast amount of time energy and money has been spent on the expansion of organized schemes to enable qualified persons to study abroad. To justify the continuation of such fellowship schemes and to ensure that the time and money are being used in the best possible way adequate evaluation of the methods and results is essential. The report of the WHO Study Group on Appraisal of Fellowships¹ exam-

ines the problems confronting administrators planning appraisal of fellowship schemes in the field of health and suggests criteria for appraisal.

As large scale appraisals are expensive it is unlikely that they will be made frequently but many day-to-day procedures in organizing fellowship schemes should be subject to continual critical examination. A precise statement of the objectives of a fellowship is a prerequisite for any satisfactory appraisal. The questions asked in the appraisal must be

World H. A. Org. (1957) Manual for the revision of the I.C.D. 9. Geneva, p. 11.

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carefully chosen to elicit the information required while eliminating subjective judgments as far as possible. Appraisals may be based on written evidence from the fellow's personal file, questionnaires, reports, etc. on the results of personal interviews or on data obtained from field visits by selected persons. The report analyses the various methods and concludes that each has its values and its weaknesses; the choice of method will depend therefore on the nature of the fellowship programme and the type of appraisal planned.

Among the criteria of appraisal suggested are the choice and qualifications of fellows, the adequacy of the programme of study and of the administrative arrangements, the ad-

justment of the fellow to the conditions of study or training, his training record and the results of his training in terms of his subsequent employment and performance, his influence on the community and benefits both to his own and the host country. Many aspects of appraisal are still in need of investigation. The report recommends the following subjects for further study: development of a series of case histories of successful and unsuccessful fellowships; formulation of specific criteria for each stage of the fellowship process; evaluation of the fellow in his environment before and after the fellowship; placement of fellows; successes or failures of fellowships; and methodology of appraisals.

Biological standardization *

The WHO Expert Committee on Biological Standardization¹ has again examined a wide range of substances of importance in therapy, prophylaxis and diagnosis, and it reports the establishment of international reference preparations of amphotericin B, kanamycin, vancomycin, viomycin, human menopausal gonadotrophin, vitamin B₁₂ and egg lecithin as well as international standards for anti-streptolysin O and swine erysipelas vaccine. Studies are under way with the aim of establishing international reference preparations of poliomyelitis vaccine, rabies vaccine, BCG vaccine, smallpox vaccine, anti-vaccinia gamma globulin, anti-leptospira sera and anti-yellow fever serum. The Committee considered the need for international reference preparations of various enzymes that are in clinical use, such as streptokinase, streptodornase. It has not yet been possible to

establish an international reference preparation of PAM, but in view of the extensive use of this preparation it was agreed that efforts should be continued to develop a more satisfactory method of evaluating the ability of PAM to provide a persistent concentration of penicillin in the blood.

A proposal to change the unit notation for penicillin was considered premature but the National Institute for Medical Research, London, has been asked to propose for the next meeting an alternative definition of the International Unit of Penicillin based on the weight of pure penicillin acid instead of on a standard preparation. In view of recent observations concerning the adsorption of purified tuberculin derivatives in high dilutions to the walls of vessels, there is an urgent need for redefinition of the International Unit of PPD and a study is to be undertaken to determine whether it would be useful to replace the present international standard by a different preparation.

The report also outlines plans made by the Committee for establishing international reference preparations and international standards for a wide variety of diagnostic reagents in conjunction with the expanding activities of WHO in the field of medical research. It was recommended that in the first place

WHO Expert Committee on Biological Standardization
(1960) *Thirtieth Session* (Wild H H, Org H R P S No 187)
47 p. Ges. Preis 1/9 \$0.30 Sw. f. l. — Also published
French and Spanish

Members of the Committee: D H H Cohen, N H L D
D D G L E, United Kingdom (Chairman); D N H Fsek
D R Y D P, Hungary; De M Rk (Rapo) Dr D C. Lah
Inda, D R M R Y USA; Dr A S Otschoorn, Ceyl
Dr V L Trost, USSR (V. Cherm); R Pese, Uve of
the Food and Agriculture Organization; Dr A. S. Ben
U. i. d. K. g. d. m. Secret. r. i. Dr A. S. Ben, so USA (Co
s. li. i. d. K. P. Badstreet, United Kingdom (Co ulant)
s. li. i. d. K. J. n. WHO (Secretary); Mr J. W. Lightb
h. i. g. d. m. (Con. 1. i. d. V. Sol, USSR (Cons li. i.)
Dr J. F. W. n. USA (Co sulta. i.)

work should be concentrated on sera used in the grouping and typing of viruses

The list of International Standards and International Reference Preparations held for

distribution at the International Laboratories for Biological Standards in Copenhagen and in London has been brought up to date and forms an annex to the report

Addiction producing drugs

In its tenth report the WHO Expert Committee on Addiction Producing Drugs¹ recommended that eight new substances derived from different chemical groups and all having morphine like effects should be subject to international control. These substances are allylprodine benzethidine furethidine levophenacylmorphan metazocine norlevorphanol phenazocine and piminodine

The Committee felt that the fundamental criterion for the establishment and degree of control is the extent to which drug induced behavioural disturbances are a risk to the community for neither the chemical structure *per se* nor any definition however des-

criptive can be a complete guide indicating which substances should be placed under control. Consequently there is a need for research along various lines in the field of drug addiction. In particular to help the World Health Organization in carrying out its functions the Committee must have at its disposal the results of basic and applied research in this field. But so far insufficient support has been forthcoming for such investigations. The Committee therefore strongly urged that research on drug addiction should be strengthened and expanded since it continues to be a serious international public health problem.

The Committee made certain technical comments concerning the draft of the Single Convention on Narcotic Drugs. It expressed the view *inter alia* that only those preparations should be retained as exempted preparations which constitute no risk to public health and from which the potentially addicting agent is not readily recoverable.

Expert Committee on Leprosy *

Although the cause of leprosy is known and an effective treatment has been discovered the disease still presents many unsolved problems. One of these is its degree of infectivity which appears to depend on three factors as yet not fully assessed: the infectiousness of the individual patient, the susceptibility of the person exposed to infection and the type of contact. Another is the classification of its many manifestations an extremely controversial subject which may nevertheless be of

crucial importance in the treatment and rehabilitation of patients.

These are two of the problems discussed by the WHO Expert Committee on Leprosy¹ in its second report. It examines the lepromin reaction which is of established value for prognosis for classification and as a test of the individual's sensitivity to the leprosy bacillus.

Members of the Committee: Dr J. A. L. S. Brown, Uganda (Rapporteur); Dr Orestes D. Iz, Brazil; M. de la Colonne, France (Vice-Chairman); Dr H. W. de, Philippines (Chairman); Dr R. V. Wardkar, India; Dr W. Bonne, WHO; Dr J. M. M. Fernández, Argentina (Consultant); Dr J. G. Prieto, WHO (Secretary); Dr V. Martine Domagala, WHO.

WHO Expert Committee on Leprosy (1960) Second report. 1961. 1. A. Ory, Geneva. R. Ser. No. 189. 27 pages. Price 9 \$0.30, 5 £ 1. — Also published in French and Spanish.

the efficacy of BCG and chemotherapy in the prevention of leprosy and present day treatment and rehabilitation of patients. It outlines the organization of a campaign to reduce the incidence of leprosy and stresses the need for proper training in and teaching of

leprology and the education of the public about the disease.

A more extensive review of the Committee's work has already appeared in the January 1960 number of the *WHO Chronicle* (pages 21-22).

Notes and News

Hidden contacts with penicillin

There is already a vast literature on the dangers of the indiscriminate use of antibiotics for therapeutic purposes. Less well known are the possibilities of accidents in persons who have become sensitive to antibiotics to which they have found themselves exposed without even realizing it. These hidden contacts, as they are termed by Bernard B. Siegel of the Allergy Division of the Department of Medicine, Jewish Hospital of Brooklyn, USA, are particularly common with penicillin and are discussed in an article by Dr Siegel recently published in the *WHO Bulletin*.¹

One of Dr Siegel's examples is of a physician who had previously experienced a severe reaction after an injection of penicillin and who collapsed after drinking a glass of milk; emergency measures being required to bring him out of a state of shock. Later he experienced several other though less severe reactions immediately after drinking milk. Penicillin is much used in the USA for the treatment of cow mastitis and has frequently been found in cow's milk in quantities sufficient to provoke allergic reactions in people who are sensitive to it.

Another example is of a nurse who had become sensitive to penicillin after several intramuscular injections. Later she was given an injection of testosterone with procaine hydrochloride for menstrual irregularity and within a short time developed pruritus, itching of the throat and generalized urticaria and angioneurotic oedema. Investigations showed that she was not sensitive

to either the testosterone or the procaine but had reacted to traces of penicillin left in the syringe. This girl had to give up nursing because she had itching of the eyes, nose and throat, swelling of the lips and tightness of the chest whenever either she handled penicillin or it was used in her presence.

A third example is of a drug salesman who had experienced severe allergic shock immediately after taking a dose of medicine containing penicillin. A month later while waiting in a doctor's consulting room he suddenly started to develop the same symptoms. At a time it was discovered, when penicillin aerosol treatment was being given elsewhere in the consulting room.

Generally sources of contact with penicillin are obvious but these examples show that they may also be hidden. Another important hidden source is virus vaccines which contain small amounts of penicillin antigen sufficient in some persons to cause allergic reactions. In view of the many hidden sources—Dr Siegel remarks—it would indeed be unwise to assume that anyone living in a modern community can escape contact with this antibiotic in one form or another. But because of the large numbers of potentially sensitive persons the greatest care should be taken to make this contact as slight as possible.

Water fluoridation in Chile

An experiment was undertaken at the end of 1953 to determine the effect of water fluoridation on the population of Curico, Chile, and also to test the ability of local personnel to carry out fluoridation, study its effects and draw up a

dental register. The concentration of fluorides was generally maintained around 1 p.p.m. (part per million) the widest variation being less than 0.0%. San Fernando a town of the same type situated some 50 km away and comparable as regards population and social economy was used as a control. At the beginning of the experiment dental examinations were carried out in both towns.

In 1956 further dental examinations were carried out using the same standards as in 1953. Over a period of 10 months four dentists examined 4740 children, 3060 in Curico and 1680 in San Fernando.

On comparing the prevalence of caries in San Fernando in 1953 with the 1956 figure it was found that in general there were no significant changes. A similar comparison in Curico revealed a distinct decrease. The data obtained in 1956 showed that in Curico the prevalence of caries was less than that in San Fernando at all ages and in particular up to the age of 6. The difference in favour of Curico was 45% in children 3 years of age, 37% in those aged 4 and 15% in children aged 5. On studying the changes occurring during this period in each town it became clear that in Curico the percentage of children between 3 and 5 years of age who were free from caries had increased from 8.6 to 27 whereas in San Fernando the increase was only from 8.4 to 13.

In the opinion of the authors of an article recently published in the *Boletín de la Oficina Sanitaria Panamericana* the above investigations justify the conclusion that the cause of the very significant improvement in dental health in Curico in 1956 was the consumption of drinking water containing 1 p.p.m. of fluorides by 90% of the population. The cost of fluoridation per person per year was estimated at 50 Chilean pesos i.e. about US\$0.05.

The hazards of eating raw fish

The Chinese liver fluke *Clonorchis* and the Oriental lung fluke *Paragonimus westermani* both cause endemic disease in the Republic of Korea. The former is common and is considered to be the principal cause of the many cases of cirrhosis of the liver in Korea; the latter though less widespread has more serious effects and is

given a high ranking among public health problems. Just how much disease is caused by each has never been adequately estimated because surveys have been based on stool and sputum examinations expensive and time consuming techniques which do not guarantee that the eggs of the parasites especially those of the lung fluke are found. An intradermal test for these infestations was recently developed however by a US Army medical laboratory and has been used in a preliminary survey of the prevalence of the diseases in certain provinces of Korea.

Both clonorchiasis and paragonimiasis but especially the former are widely prevalent among Korean adults—a discovery that conflicts with the previous view that they occur primarily in limited foci. In many areas admittedly the cases are probably not autochthonous most of the people found in the survey to be positive reactors admitted to having travelled or lived in endemic areas and to having eaten raw fish there. The migration of the population southwards during the Korean war doubtless contributed greatly to the spread of the infestation. Among males the percentage of clonorchiasis is higher than among females the reason for this probably being that men gather socially to drink rice wine and eat raw fish with it. Women are infrequent attenders at these gatherings therefore much less exposed to infestation.

Paragonimiasis is usually thought to be caused by eating raw freshwater crab but many Koreans with the disease denied doing this. In a large number of areas too the usual method of preparing uncooked crab includes heavy salting and it is questionable whether the metacercariae could survive the three days in the brine that people deem necessary to give the crab a proper flavour. Perhaps—suggest the authors of an article on the survey in a recent WHO Bulletin—the mode of infestation is to be sought elsewhere as for example in the traditional home treatment of measles with the juice of crushed raw crayfish.

Proceedings of atomic energy conference

The Second United Nations Conference on the Peaceful Uses of Atomic Energy was held in

Geneva in September 1958 and the publication of its proceedings¹ is now complete. The 33 volumes including an index give a comprehensive account of the work being done all over the world on the manifold peaceful uses of atomic energy. The volumes contain a total of 19 000 printed pages and 15 000 illustrations and their publication so soon after the Conference is a remarkable achievement.

Of particular interest to those concerned with the biological and medical aspects of the subject are Volume 18 which deals with the treatment of atomic wastes and environmental aspects of atomic energy. Volume 21 on health and safety giving biological standards relating to dosimetry and measurement systems followed by nations engaged in atomic energy programmes. Volume 22 on the biological effects of radiation. Volume 23 on experience in radiological protection containing details on occupational hazards of workers in atomic energy plants and safety regulations. Volumes 24 and 25 on isotopes in biochemistry and physiology. Volume 26 on isotopes in medicine and Volume 27 on isotopes in agriculture. The prices of these volumes range from \$10.50 £3.15s or Sw. fr. 45 to \$16.50 £5.18s or Sw. fr. 70.

Training of sanitary inspectors

The fourth 10 week advanced training course for sanitary inspectors in the Philippines is now taking place in Pasig Rizal Province. These

courses were started by the Philippine Department of Health in June 1958 with the co-operation of the WHO Regional Office for the Western Pacific, the Philippine National Economic Council and the US International Cooperation Administration (ICA). The technical adviser for the courses is Mr Gerard Murphy a WHO sanitarian. The 1960 course is being attended by 79 sanitary inspectors from the principal municipalities in the Philippines. 85 sanitary inspectors were trained in the earlier courses. To accelerate the training programme and cover as many municipalities and provinces as possible a second training centre is being planned in Baguio City with help from WHO.

Tenth international anaesthesiology course

The tenth anaesthesiology course held under the auspices of the Danish Government and the WHO Regional Office for Europe opened in Copenhagen on 26 January 1960. These courses started in 1950 and were at first planned for Scandinavian students only but physicians from other countries were admitted and to date they have been attended by a total of 254 physicians from 38 different countries. The 1960 course is being attended by 45 doctors from 21 countries in Europe, the Americas, Asia and the Eastern Mediterranean Region.

Details on the courses and on the work of the anaesthesiology centre in Copenhagen can be found in the March 1958 number of the Chronicle (page 69).

United Nations (1958-1959) *Proceedings of the Special Conference on the Peaceful Uses of Atomic Energy* 33 vols, Geneva

People and Places

Dental health in Thailand

Dr Robert Harris, Head of the Department of Preventive Dentistry of the University of Sydney, Australia, is at present paying a second visit to Thailand as WHO consultant in dental health. His first visit was in 1957 when he advised the Government on the development of dental education and dental services. During the present visit

which is largely in the nature of a "follow up" he will advise on the development of preventive dentistry.

Formerly Professor of Conservative Dentistry at the University of Otago, Dunedin, New Zealand, Dr Harris is editor of the *Australian Dental Journal* and has taken an active part in dental research in Australia.

Teaching of physiology in Cambodia

Under a programme of WHO assistance to the Royal School of Medicine Phnom Penh Dr Ilse von Holten from the Centre of Experimental Therapeutics Hôpital de la Pitié Paris is at present spending three months in Cambodia to help the school establish a department of physiology. Funds and supplies for the programme—which aims at expanding the school's training facilities—are provided by the French Economic Mission, the US International Co-operation Administration (ICA) and United Nations Technical Assistance.

Born in Capetown Union of South Africa Dr von Holten obtained her diploma in physiology chemistry and public health from the University of Stellenbosch and her doctorate in sciences from the University of Paris. After a period as lecturer in physiology at the University of Pretoria South Africa she returned to Paris to undertake experimental research on cardiac and cerebral physiology.

Inter-Regional Diarrhoeal Diseases Advisory Team

Dr Fred J. Payne has been appointed team leader and epidemiologist on the newly formed WHO Inter-Regional Diarrhoeal Diseases Advisory Team. In this capacity he visited Yugoslavia and several other eastern European countries in February. The other members of the team—including a bacteriologist and a paediatrician—will join Dr Payne later for intensive studies in the African Region.

Dr Payne received his medical training at the University of Pittsburgh and subsequently studied public health at the University of California. He has served with a dysentery unit on Kojima Island Korea and as Chief of the United States Public Health Service Enteric Disease Investigations Unit. For the past two years he has been engaged in studies on the epidemiology of diarrhoeal diseases in the United States.

Maternal and child health appointment

Dr Marcèle Dorion of Canada, has joined the staff of the maternal and child health programme which was undertaken in Tunis in 1957 with the support of WHO and UNICEF. She will help in the expansion of the programme and in the training of professional and auxiliary personnel.

As consultant to the Quebec Department of Health Dr Dorion has been responsible since 1954 for instructing the staff of 70 rural health units in maternal and child health. She has also done research on such public health problems as prematurity and hospital cross infections.

Training centre for deaf mutes

In 1958 a national training centre was established in Japan for early diagnosis and treatment of deaf mutes, their occupational training, advice to their families and education of the public on the subject. Dr M. F. Palmer, Professor and Head of Department of Logopedics, University of Wichita, Kansas, USA, has been appointed by WHO to advise the Japanese Government on the further development of this centre.

Dr Palmer has more than twenty years' experience of teaching clinical work and research in logopaedics.

Nutrition appointments

Dr D. M. Blankhart has been appointed WHO Inter-Regional Adviser on Nutrition for the Eastern Mediterranean and African Regions. He will advise the Regional Offices and national governments on all matters connected with nutrition and especially on public health aspects. He will also collect information on nutrition and nutrition activities in the different countries in the Regions. A graduate of the University of Utrecht, Netherlands, Dr Blankhart was on the staff of the Nutrition Institute in Djakarta, Indonesia, prior to his appointment with WHO.

Population movements and malaria eradication

Mr R. M. Prothero is to visit Africa on behalf of WHO to study the relationship of population movements to problems of malaria eradication. His itinerary will include the Sudan and the Somaliland territories, as well as various parts of East and West Africa. He will also spend several days at the Rhodes-Livingstone Institute in Lusaka, Northern Rhodesia, where the subject of migration in Africa has been intensively studied.

Mr Prothero is a geographer by profession and a lecturer at the University of Liverpool, England. After teaching at Edinburgh University, he joined the staff of University College, Ibadan, Nigeria. There, while working with the West African

Institute of Social and Economic Research he gained a close insight into many of the phenomena of migration

Public health adviser for Cambodia

As part of its policy of helping governments strengthen their health administrations WHO has appointed Dr Jacob Bierdrager as public health adviser to the Government of Cambodia. Dr Bierdrager will help the Government to co-ordinate its public health programmes survey health conditions and plan long term national health programmes as the need arises. He will also co-ordinate WHO assisted projects in Cambodia with the national health plan.

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Review of WHO Publications

TUBERCULOSIS

Bulletin of the World Health Organization 1960
Volume 22 Number 1 2 (pages 1-196)

In earlier numbers of the Bulletin several reports have been published showing that micro organisms other than tubercle bacilli and as yet unidentified may be responsible for the low grade tuberculin sensitivity observed in certain parts of the world. The first paper in this number by Nyboe gives a comprehensive analysis of the results of tuberculin testing carried out by WHO research and survey teams in a total of 33 countries during the last ten years. The data confirm that the low grade tuberculin sensitivity is distributed according to a striking geographical pattern in countries with a temperate or sub-tropical climate the reactions to a low dose of

tuberculin are of two different kinds—clearly positive or clearly negative—whereas in tropical lowlands a large proportion of the reactions are of intermediate size. This distinct epidemiological pattern may provide a clue to the etiology of such reactions. The practical implication of this finding is that in tropical countries a clear-cut distinction between persons infected with tubercle bacilli and those not infected can hardly be made by means of the present tuberculin test. The selection of persons for BCG vaccination is therefore difficult in these countries and the diagnostic value of the tuberculin test is low.

Tuberculosis is supposed often to result from a household infection and "contacts" of tuberculous patients are usually given special attention in tuberculosis control programmes. In the second paper in this issue Andersen & Geser have

made an examination of the tendency for infection in children to be accumulated within particular households using data from a number of WHO tuberculosis prevalence surveys in Africa. Only persons with strong allergy were counted as positive reactors so as to avoid the inclusion of too many persons with low grade non specific sensitivity.

The results show that although there is a statistically significant tendency for positive reactors to accumulate in certain households this tendency is surprisingly weak. Only a modest proportion of all infected children seem to have acquired infection within their own households. The authors discuss the practical implications of their findings in detail and conclude that it would scarcely be justifiable in the countries and populations examined to concentrate tuberculosis control measures on households with many tuberculin positive children, perhaps not even on households with known cases of infectious tuberculosis because such households seem to represent only a small fraction of the total tuberculous infection and disease in the community.

WHO recommends that a tuberculosis programme in a less-developed country should include at a certain stage the establishment of a national pilot area project. Dr Frimodt Møller's report on a community wide tuberculosis study in Madanapalle India describes such a project covering a population of 60 000 with a high prevalence of low grade tuberculin sensitivity and as it turned out, with a rather low prevalence of tuberculosis. This population was followed between 1940 and 1955 with annual X ray and tuberculin testing and the hospitalization of infectious cases. During this period the mortality from tuberculosis was reduced rather dramatically, presumably because of treatment with anti tuberculosis drugs but the prevalence of tuberculosis seemed unchanged. The author concludes that even with active and planned efforts quick results in controlling or eradicating tuberculosis can scarcely be expected in a community like the one described.

The paper also reports on a BCG trial that gave rather disappointing results, in terms of both allergy and immunity in the vaccinated persons. Although the most obvious among the possible explanations of this is that a severely attenuated vaccine was used in the trial the findings also

raise once more the important question whether persons with low grade (presumably non specific) tuberculin sensitivity already possess a certain degree of acquired immunity.

The transport of vaccine in tropical regions presents considerable difficulty owing to the vulnerability of liquid BCG vaccine to exposure to heat and to light. The fourth paper in this issue by Geer & Azuma deals with the effects of storage of Japanese freeze-dried glutamate BCG vaccine at higher temperatures on its allergenic potency in human beings. Whereas liquid vaccine was seriously damaged after one month's storage at 30°C the allergenic potency of the freeze-dried glutamate vaccine was not much altered after one month at 45°C. The duration of the allergy induced by such heat treated vaccine and other problems concerning the use of freeze-dried BCG vaccine are still under study.

One of the several methods in common use for assessing the biological activity of BCG vaccines is the vaccination and subsequent tuberculin testing of guinea pigs. The last two papers in this issue by Tønderlund, Bunch Christensen & Waaler give a detailed account of the allergic response in guinea pigs to BCG vaccine—an account intended to provide a basis for the future use of the method. One paper is concerned with the duration of allergy after vaccination with standard strength vaccine and more particularly with the effect of the tuberculin test itself on the animal's ability to react to subsequent tuberculin tests. The authors demonstrate that allergy is apparent after as little as one week, reaches a maximum after 1 month, remains stable for about one month then begins to decrease steadily and has practically disappeared after 12 months. This however is true only if each animal is tested not more than once after vaccination with repeated tests in the same animal there is practically no waning of allergy even one year after vaccination. This has been demonstrated in the present studies by giving one half of the animals an extra tuberculin test two weeks before the test for the final evaluation of allergy. Thus the tuberculin test has a boosting effect on waning allergy though not on the allergy at its maximum strength.

In the last paper the development and course of allergy are examined not only for standard strength vaccine but also for tenfold dilutions

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variation of the plaque inhibition test here described by Porterfield. It is particularly applicable to epidemiological research on yellow fever and enables new viruses to be discovered.

Serum and vaccine treatment of rabies is still under trial. Veeraraghavan & Subrahmanyam assess the effectiveness of this method of treatment against challenges of increasing severity and consider that it is superior to treatment with vaccine alone only at a challenge of 50 LD₅₀ and above being fully effective at challenges of between 100 and 300 LD. No treatment is effective against a higher challenge and none gives 100% protection.

The application of tissue culture techniques to the study of rabies virus has met with limited success. M. M. Kaplan and his colleagues report progress in the cultivation of rabies fixed virus in explants of hamster kidney tissue and demonstrate that cultured virus can be stained by means of the fluorescent antibody technique.

Smallpox vaccine is the subject of two papers. In one C. Kaplan compares two methods of vaccinia virus titration—intravenous injection of chick embryos and pock-counting on the chorio-allantoic membrane of chick embryos. The intravenous injection method is lengthy and differences of virulence may falsify comparisons between the results obtained by this method and those obtained by the pock-counting method into which the virulence factor does not enter.

The deterioration of smallpox vaccine at different temperatures can be assessed by the

accelerated degradation test described in a note by Fisek.

The influenza pandemic of 1957-58 was observed in particularly favourable conditions in the Netherlands where it began at a time when the incidence of respiratory infections was at its minimum. Its course and seriousness could therefore be gauged with a fair degree of accuracy. Mulder & Masurel give an account of the pandemic, discuss the conditions which probably favoured the spread of the influenza wave and note the persistence of the virus in the population several months after the end of the epidemic.¹

When influenza is diagnosed serologically by the haemagglutination inhibition test the presence of non-specific inhibitors may falsify the results. Ananthanarayan & Paniker discuss these inhibitors showing that they are present in the normal sera of man and animals and describe the qualitative and quantitative differences between them. They conclude that no technique for the destruction of the inhibitors can be effective in all cases and recommend the combination of several techniques.

Gibinski et al. describe an epidemic of Bornholm disease in Upper Silesia which showed a change within a short space of time in the group of Coxsackie virus circulating among the population.

¹ A summary of this article appeared in *WHO Chron.* 1960, 14, 83.

² A summary of this article appeared in *WHO Chron.* 1960, 14, 12.

thereof down to dilutions so thin that they contain on average less than one viable unit per dose. To avoid the boosting effect of tuberculin each animal was tested only once.

It was seen that diluted vaccine (down to 1/10 000 of standard strength) gives an allergy that develops late yet becomes nearly as strong as that after standard strength vaccine 10-12 weeks after vaccination. With greater dilution of the vaccine few or no animals became allergic. But even with the very weak doses of vaccine the guinea pig either becomes allergic and then ultimately rather strongly allergic or else remains quite anergic. This is in striking contrast to the response to BCG in human beings in whom the strength of allergy depends on the size of the dose of BCG.

These findings no doubt necessitate a reconsideration of the use of allergy in guinea pigs for assays of BCG. An assay method should allow of differentiation between strong and weak vaccines, more particularly the measurement of allergy in animals should make it possible to predict the allergenic potency in man. Apparently a tuberculin test in a vaccinated guinea pig does neither.

VIRUS DISEASES

Bulletin of the World Health Organization 1960
Volume 22 Number 3-4 (pages 197-438)

Virology today is at the same stage as bacteriology was at the beginning of the twentieth century. New pathogenic organisms are constantly being discovered, methods of culture and investigation are being improved, protective measures are being worked out and becoming established practice. As the biology of viruses grows more complex and refined, so do research techniques become finer and more precise. The ingenuity of a host of research workers is being put to the test by the antigenic lability of the viruses, by their existence in masked forms in reservoir hosts (still mostly unknown) where they escape current methods of investigation and by our ignorance of the pathogenicity of many of those found in man and beast. One of the chief tools of virological research is serology. Because viruses

stimulate the formation of specific antibodies in the body, vaccination ensures some degree of protection and opens the door to an effective means of combating the diseases they cause. Epidemiology based on serological investigation also makes it possible now to study the distribution of viruses and virus diseases on a world scale through the traces they leave in populations in the form of antibodies.

Most of the articles in the issue of the *Bulletin* under review deal with live poliovirus vaccination; these are discussed elsewhere in the present Chronicle (see page 137).

Although poliomyelitis is still very much to the fore, other enteric viruses are becoming of increasing importance. Those which cause diarrhoea and the enormous group of orphan viruses whose etiology is as yet obscure form a fresh group of infectious organisms. There are the ECHO viruses in man and similar viruses found in animals which are designated—according to the animal harbouring them—by such abbreviations as ECCO, ECMO, ECBO and so forth.

In his general review of orphan viruses, Kalter describes the types found in animals and methods of isolating them and touches on theories about the nature of the masked forms in which they appear. One of the difficulties encountered in the identification and isolation of viruses in tissue cultures arises from the presence in explants of masked viruses which may display cytopathogenic activity in serial cultures and so prevent identification of the viruses sought.

Culture contamination is studied in greater detail by Tobin in a note on the possible presence of monkey viruses pathogenic to man in tissue cultures of monkey kidney. The author stresses the drawbacks their presence may have in cultures used for the production or checking of poliomyelitis vaccines and the risks of laboratory infection to research workers.

In a general review of the ecology and etiology of the arthropod-borne encephalitides, Miles discusses the work done on virus transmission cycles on reservoir hosts (birds and animals) and on the seasonal and climatic conditions favouring epidemics of encephalitis.

The laboratory or field diagnosis of virus diseases can be made easier by a simplified

CORRIGENDA

Vol 13 No 12

INTERNATIONAL NON-PROPRIETARY NAMES FOR PHARMACEUTICAL PREPARATIONS

p 465 chemical formula for carbinoxamum

delete chlorphenylmethane

insert chlorophenylmethane

p 466 chemical formulae for cycrimin and

dothetrinum in each case

delete propan-1-ol

insert propan-1-ol

p 467 twelfth name (Latin)

delete fludrocortison

insert fludrocortisoni

p 467 chemical formula for hexylcainum

delete 2-propyl

insert 2-propyl

p 471 fifteenth name (Latin)

delete phthalysulfamethizolum

insert phthalysulfamethizolum

International Non-Proprietary Names for Pharmaceutical Preparations

In accordance with paragraph 3 of the Procedure for the Selection of Recommended International Non Proprietary Names for Pharmaceutical Preparations¹ notice is hereby given that the following names are under consideration by the World Health Organization as proposed international non proprietary names

Comments on or formal objections to the

proposed names may be forwarded by any person to the Pharmaceuticals unit of the World Health Organization within four months from 1 April 1960

The inclusion of a name in the lists of proposed international non proprietary names does not imply any recommendation for the use of the substance in medicine or pharmacy

PROPOSED INTERNATIONAL NON PROPRIETARY NAMES (*Prop INN*) LIST 9²

Prop d I t e t i l
N n P p t a r y N m
(Latin English)

Ch m I N m D l p t

allylprodinum	3 allyl 1 methyl-4-phenyl-4 propionoxypiperidine
allylprodine	
benzethidinum	1 (2 benzyloxyethyl)-4-phenylpiperidine-4-carboxylic acid ethyl ester
benzethidine	
furethidinum	1 (2 tetrahydrofurfuryloxyethyl)-4 phenylpiperidine-4-carboxylic acid ethyl ester
furethidine	
levophenacilmorphanum	() 3 hydroxy N phenacilmorphan
levophenacilmorphan	
metazocinum	1 2 3 4 5 6 hexahydro 8 hydroxy 3 6 11 trimethyl 2 6-methano 3 benzazocine
metazocine	
norlevorphanolum	() 3 hydroxymorphan
norlevorphanol	
phenazocinum	1 2 3 4 5 6-hexahydro 8 hydroxy 6 11 dimethyl 3 phenethyl 2 6-methano 3 benzazocine
phenazocine	
piminodinum	1-(3 phenylaminopropyl)-4 phenylpiperidine-4-carboxylic acid ethyl ester
piminodine	

¹Off Rec Wld Hlth Org 1955 60 3 55

²Other lists of proposed international non proprietary names can be found in: *Ch Wld Hlth Org* 1953 7 99 1954 8 216
313 1956 10 28 1957 11 231 1958 12 102 *WHO Ch lct* 1959 13 105 15

WHO CHRONICLE

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189 *Black flies and onchocerciasis*
191 *International work in health statistics — 10*
194 *Leading causes of death*
196 *Suicide a neglected problem*
198 *Smallpox in 1959*
198 *Cholera in 1959*
201 *The epidemiology of cancer of the lung*
204 *Insecticide resistance and vector control*
204 *Notes and news*
209 *People and places*



WORLD HEALTH ORGANIZATION

TUBERCULOSIS

The efficacy of the tuberculin test—an analysis based on results from 33 countries—Jørgen Nyboe

The distribution of tuberculous infection among households in African communities—Stig Anderson & Anton Geser

A community wide tuberculosis survey in a South Indian rural population 1950-55—J. Frimodt Møller

Further studies on the heat stability of freeze dried glutamate BCG vaccine—effect of storage at 30°-50° C on allergenic potency in humans—Anton Geser & Yoshikuni Aizawa

Development and duration of BCG induced allergy in the guinea pig—Knud Tønderlund, Kirsten Bunch Christensen & Hans Waaler

Development and course of tuberculin allergy in guinea pigs vaccinated with various doses of Danish liquid BCG vaccine—Knud Tønderlund, Kirsten Bunch Christensen & Hans Waaler

BULLETIN OF THE WORLD HEALTH ORGANIZATION

Vol 22 No 1-2 (1960) 196 pages

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HEALTH ASPECTS OF URBANIZATION IN AFRICA

Some of the earliest towns were in Africa in the Nile valley and along the shore of the Mediterranean. In Africa as a whole however urbanization has been a phenomenon of the past century or less a product of the contact of African with European civilization. The towns which are appearing or developing into cities all over Africa are not like the towns of ancient times or even like those of the Middle Ages which grew slowly over the years. They resemble rather the towns of the Industrial Revolution of western Europe which in a few years developed from villages into enormous sprawling conglomerations the abode of "pestilential heapings of human beings".¹ In these nineteenth-century towns whole families occupied small dark rooms in dirty hovels without water or sanitation. The streets outside the houses were filthy the rooms in which people lived more like pigsties than human habitations unventilated strewn with rushes that were seldom changed. There were no underground drains and the soil of the town was soaked with the accumulated filth of centuries. Engels² described a slum in Manchester in 1844 as

A sordidly collected mass of tall three or four storied houses with narrow crooked filthy streets occupied from cellar to garret filthy with a dirt with out and the appearance such that no human being could possibly wish to live in them. But all the nothing in comparison with the dwellings in the narrow courts and alleys between the streets entered by covered passages between the houses, in which the filth and tottering ruin surpass all description. Scarcely a whole window pane can be found the wall is crumbling doorposts and window frames loose and broken. Heaps of garbage and mess lie in all directions and the foul liquids emptied before the doors gather in stinking pools.

A report of a Royal Commission into the State of Large Towns and Populous Districts in England and Wales 1845³ commenting on these horrors remarked only that

It is too commonly supposed that the evils above adverted to are the inseparable concomitants of poverty and doubtless so long as the inhabitants of the most neglected and filthy abodes in crowded cities are unable to provide for themselves better and healthier dwellings sufficient light and air more open situation effective cleansing and drainage and adequate supplies of water their poverty and health are undermined and the result is shortened by the deleterious eternal influences consequent upon the want of efficient arrangements for securing the above objects.

The expectation of life of the people who lived in these slums was extremely short. They were the prey to a host of diarrhoeal and respiratory diseases. Cholera when it invaded the countries of western Europe in the great pandemics of the nineteenth century killed large numbers of them. Tuberculosis was rife. The women died in large numbers in childbirth and the mortality among the sickly undernourished children was high. Food was always in short supply and what there was was often unfit for human consumption. The climate in many of these industrial towns is cold and rainy for long periods during the year and the atmosphere is polluted with soot and chemicals. In the nineteenth century the pollution was often worse and many of the people who lived in the towns had neither warm clothing nor fires to protect them from the cold and damp. Overcrowding bred promiscuity and venereal disease was common.

In Africa a somewhat similar process is at work. The towns are expanding in size at an astonishing speed. Luanda in Angola which had a population of 61 028 in 1940 had on

¹ Simon J. (1887) *Public Health* London, vol. I 48 (Quoted in) Benckel, G. (1932) *World Health* A Harmondsworth, Penguin Books.

² Engels F. (1899) *The condition of the working class in England in 1844* London (first published 1901) (Quoted in) Drummond, J. C. & W. Trevelyan, A. (1932) *The Englishman's food* London, Jonathan Cape.

³ Prince G. (1859) *London ancient and modern* London, p. 61 (Quoted in) Benckel, G. (1932) *World Health* A Harmondsworth, Penguin Books.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

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*Life in the African village
has scarcely changed in the
decades of years. The distance to
the towns means not only a
break that distorts
society but adjustment to a
completely different physical
environment.*



The change from village life to town life requires a great effort of adjustment in the immigrant. In the African village people generally produce enough to feed house and clothe themselves. They trade by barter exchanging what they produce for the commodities which satisfy their simple needs. They are on the whole their own masters. In the village status is determined by birth. A chief's son is likely to become a chief himself and he will in any case be an important person in the community. Traditions govern behaviour and the need for the enforcement of law is thereby diminished. Village life is based upon the extended family: members live in the same compound and pool resources forming thus a sort of miniature welfare state and presenting a united front against the world. Marriage determined by custom is a contract between families.

In the town the situation is totally different. Instead of the subsistence system of the villages there is a money system: everything must be paid for; there is an opportunity of saving money against future needs or of squandering it on present pleasures. The immigrant is no longer master of his own

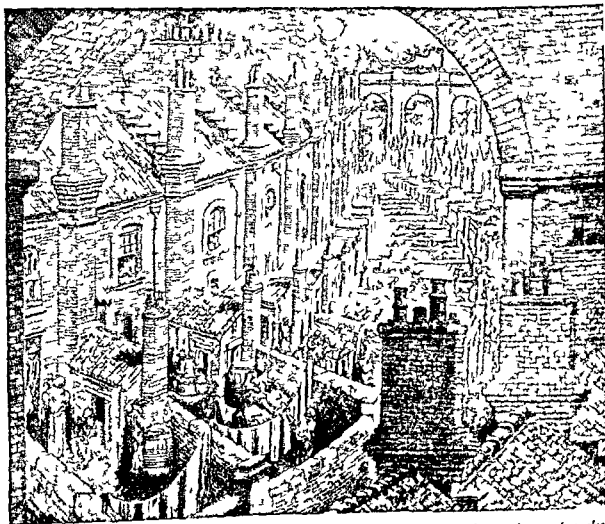
time: he must work specific hours and keep to a schedule. Nor does his status in the village give him any advantages in the town: his position in the community is determined by his own performance. The traditional standards of behaviour of the village are lacking so that enforcement of law and order acquires a new importance. The extended family system holds no sway in the town where indeed an individual may have no relatives at all and he must therefore, whether he is well or ill, depend on his own efforts or on the goodwill of some voluntary or government agency. Marriage is no longer a contract between two families but between two individuals whose families may not even live in the same or a neighbouring village or town.

The change from village life to town life in Africa will require more than a mere adjustment of the individual's standards of conduct; it will also require an adjustment to a different material environment. In the village there is no shortage of land but in the town it is both in short supply and expensive so that the problem of housing may well be acute. In the village too while precautions against disease are important

of 189 390 in 1955 Tananarive in Madagascar had 104 000 in 1935 and 201 000 in 1958 the mean yearly increase of population being almost 5000 In Tanganyika the urban population has doubled in the past ten years Leopoldville in the Belgian Congo had a population of 190 000 in 1950 it now has one of 320 000 There is no prospect of a change in this situation which is mainly due to a vast influx of people from the country into the towns indeed the urbanization of Africa is expected to continue at an increasing pace for many years

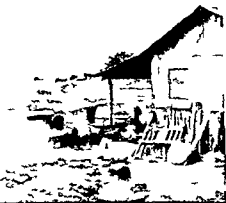
The reasons for this drift to the towns are not peculiar to Africa but are world wide

In the rural areas there is much to do during the periods of sowing and of harvesting but in between there are spells of inactivity when the young and active become bored and seek a means of escape from their boredom In the past they might have devoted their leisure to warfare but this is no longer possible The impact of modern civilization is relaxing the hold upon them of their ancient traditions and customs and they no longer submit tamely to the occasionally irksome requirements of tribal life And the town is a magnet with its promise of work money more freedom and a variety of attractions to which distance lends enchantment



Dore's nightmare evocation of the London slums in the 1870s—grime, overcrowding and general squalor. In the rapidly growing towns of Africa there is danger of a similar situation

(© R. d. o. Times Hulton Picture Library)



*Formal multiplanned community. The timbered
planned by local modern designs (above right)*

Shanties of Tema in Ghana (below left) have a

*An African village woman fills her pot at the water-hole (below left). The going to the source of
supply a few feet is a less primitive domestic problem of a native as in the new Ghanaian town of Tema
(below right) because the pot is not as heavy as the one used in the village.*



they are less urgent than in the town because there are plenty of open spaces and no over-crowding village standards of sanitation may indeed be downright dangerous in the town

The situation created by the rapid urbanization of Africa was examined in its medical aspects by the WHO Regional Committee for Africa at its ninth session in Nairobi in September 1959. The influx of immigrants into the towns leads to overcrowding which in turn produces water shortages overloading of existing sewage disposal systems the creation of fresh sanitary problems in towns without such systems and the risk of spread of infectious diseases. The rural immigrant as one of the contributors to the Committee's discussion pointed out is the least adequately protected of all town dwellers from the standpoint of environmental sanitation because of his poverty and his ignorance of the ways of the town. He is poorly housed and badly fed he is without access to a wholesome water supply his personal hygiene is of the lowest standard. Sanitary measures seem to be designed less to protect his health than to protect the town community from any infection he might carry. His attempts to earn a living by hawking food and drink for example, are frowned upon. Householders are prevented by anticrowding measures from giving him cheap shelter. His very presence in the town is discouraged not only by the health authorities but also by the police. He accordingly settles outside the town entering it daily to look for employment and the overcrowded insanitary hovels in which he and his fellow immigrants live form the peri-urban slums the shanty towns of modern Africa. From the sanitary aspect Engels' description of the Manchester slums in 1844 is applicable to these shanty towns. Sanitation is non-existent and open drains run down what passes for streets. The shanties are built of mud and wattle old packing-cases or kerosene tins with tattered blankets as doors. Children crawl among the uncollected rubbish or in the drains. Water has to be fetched from a pump well or tap and may be contaminated. The atmosphere is unlikely

to be polluted as it was so often in Industrial Revolution towns and the warmer climate leads to life being spent out of doors to an extent not possible in more northern latitudes but the climate also encourages vast numbers of flies and mosquitos and in places the snails which transmit bilharziasis. Occasional floods convert the ground into a quagmire. Malaria the diarrhoeal diseases tuberculosis bilharziasis and the helminthiasis all abound. Malnutrition is common with its train of deficiency diseases and kwashiorkor. The destruction of tribal traditions and the general social disorganization lead to alcoholism prostitution and venereal disease and mental disorders are frequent. Morbidity and mortality are both high.

There is much general agreement on the steps to be taken to remedy the situation created by the too rapid urbanization of African towns and a feeling that the evils of the Industrial Revolution should be avoided as far as is humanly possible. Towns should be planned to take account of the expansion of the population and of the peculiarities of the site upon which they are built. They should not as one contributor to the Regional Committee's discussions emphasized follow blindly advice given years ago for circumstances that have changed utterly since. The instance he cited is Tanganyika which abounds in small trading centres. These centres all look much alike not surprisingly since they were all planned in accordance with the guidance given to those responsible for their sanitary control in a pamphlet published some thirty years ago. The standard lay out was of the geometric grid iron pattern and was more or less faithfully followed irrespective of whether the trading centres were on the plain in the valleys or on the tops of hills. If the centres remained small and the site was flat little harm resulted from following the plan recommended but if as has happened at Dar es Salaam Moshi and elsewhere through Tanganyika the centres have become the hub of large towns there is difficulty in zoning and in the provision of adequate sanitary services. With an undulating or sloping site a gravity system of main pipe drainage may be impossible. In the

planning of a town for future expansion there is always the difficulty that expansion may not take place but in the light of the world wide trend towards urbanization it may confidently be assumed that for every case of expansion that does not take place there will be ten that will

Town planning must the Committee agreed allow for the provision of adequate healthy housing within the means of the lowest paid worker for the supply of abundant and safe drinking water and for the satisfactory disposal of waste products and storm water. The Ministry of Health Ghana in a contribution to the Committee's deliberations described the problem of the disposal of waste matter including sullage and storm water as a constant headache for the public health worker in the urban areas. Except in Tema which is being built no town in Ghana has a sewerage scheme for the disposal of human wastes. Septic tanks are becoming more widely used but in the larger towns excessive soil pollution and the pollution of the water supply through defective underground drains are a danger and—in the Ministry's words—a constant nightmare for the public health authorities of the country. The former system of disposing of night soil by dumping it into the sea or by trenching and the controlled tipping of general refuse are no longer suitable for urban areas. None of the main towns has an adequate drainage system for sullage water let alone storm water. In Accra certain parts of the town are flooded annually with much ensuing inconvenience and damage to property. The housing shortage has increased public health problems in some directions but the introduction of a piped water supply in some towns has led to the dramatic disappearance of such diseases as guinea worm and bilharziasis.

Not the least important part of a town planning programme is concerned with green belts. A contributor to the Committee's discussions from the Belgian Congo suggested that the result of the enormous increase in the number of buildings in Leopoldville to house its growing population has been in the absence of green belts to reduce the rainfall and create a microclimate which is less favourable

for human habitation than when the town was smaller. Green belts function as air conditioners as the lungs of a large town and constitute one of the elements making for individual and social stability in a community.

If the new African towns are properly planned with wide well laid-out streets in keeping with local climatic conditions green belts of sufficient size houses that provide adequate protection against the fierce climate efficient garbage disposal services plentiful supplies of pure water good sewerage systems and offices and workshops in which the worker's health is really looked after then—according to the Angola Health Services contribution to the Committee's discussions—there is no reason why life in the towns should not be more healthy as well as more agreeable than life in the rural areas. The presence side by side of populations of different levels of civilization should be a powerful factor in the education of the less civilized not only in matters of health but also generally for it must be remembered that the towns are the main centres from which the elite and the ruling classes of a country are recruited.

Because of the ignorance of the rural immigrants health education should be given a major role. The quarters of the town in which they live however cannot be left in neglect sanitation should be enforced but it should be adapted to their habits and traditions as closely as possible so that there is no maladjustment or need for the use of excessive constraint. Little by little the immigrants will adapt themselves to the new conception of life that they will acquire in the towns. In the meantime the health authorities will combine persuasion with only that amount of compulsion that will be necessary to secure an adequate sanitary standard.

The Regional Committee for Africa stressed the need for the preventive and curative services to adapt themselves to the new conditions created by urbanization. A closer relationship should be built up between the patient and the doctor and reinforced by an ample service of community nurses. The people concerned should be told why health measures are required with adequate health

tance in the community is still unknown. Also unknown is the part played by infections elsewhere than in the intestinal tract. Professor Ordway⁶ thinks that the concept of "parenteral diarrhoea" is over rated but it is one that is widely held.

The difficulties about etiology may be illustrated by the situation in some countries. In a study in England and Wales of 905 patients with diarrhoea enteropathogenic *E. coli* were present in 24 / *Shigella* in 75 / and *Salmonella* in 16 / leaving the majority undiagnosed. In Leningrad USSR of 1215 children under 1 year with diarrhoea 27 / had salmonellosis 144 / shigellosis and 828 / *E. coli* infection among those from whom a causative agent was isolated.

In Brazil where an outbreak of diarrhoeal disease occurred in 1957 in Fortaleza in 70 children examined 42.8 / of infections were attributable to *Shigella* 10 / to *Salmonella* and 14.3 / to pathogenic *E. coli*. As far as is known the most important etiological agent in Yugoslavia is *Shigella* although outbreaks of *Salmonella* and *E. coli* infection do occur. In Losnica Yugoslavia investigations on the carrier rate revealed that 50 / of the population were harbouring *Shigella*. In the same town helminthic and protozoal infections were found in conjunction with the *Shigella* but their role was impossible to determine.

What is the relationship of malnutrition to the diarrhoeal diseases? Much has been written to stress the association of the two. A South African study of 100 consecutive cases of diarrhoea found that 12 out of 17 undernourished children over 5 months of age had had attacks of diarrhoea previously whereas only 9 out of 47 adequately nourished children had had them.⁸ On the other hand diarrhoea is rampant in Egyptian communities where malnutrition is not common. In theory malnutrition should lower the resistance to infection but since the parasite is competing with the host for food lack of protein may react adversely on it as well. However while a parasite may suffer more than the host when a specific dietary com-

ponent such as a vitamin is lacking generally the host is the chief sufferer. It has often been observed for example that a well nourished animal has relatively few parasites. Nevertheless enteric infection with bacteria and parasites has not been encountered any more frequently in patients with kwashiorkor than in those who are better nourished. It is generally accepted although without adequate epidemiological evidence that chronic diarrhoea is a symptom of kwashiorkor but since morbidity and mortality reach their peak at an earlier age for diarrhoea than for kwashiorkor conclusions based on older children do not necessarily apply to younger ones most of whom present less striking evidence of malnutrition. Whatever its etiology diarrhoeal disease is aggravated by malnutrition in the presence of the latter there is a marked disturbance of the body fluids with a reduction in the osmotic pressure and an expansion of the extracellular space a condition which is often associated with diarrhoea and responds relatively poorly to generally accepted modern methods of intravenous fluid therapy. Does diarrhoea lead to malnutrition? Some of the evidence indicates that it might. Observations show that the peak incidence of kwashiorkor follows that of diarrhoea.

Epidemiological investigations

Epidemiological information on the diarrhoeal diseases is still too meagre particularly for the less-developed countries. Carefully designed relatively detailed studies are needed. Good examples are those carried out in Yugoslavia by a team consisting of a bacteriologist a parasitologist and a clinician under the direction of an epidemiologist. The supporting staff included nurses and other field workers and technicians able to carry out a substantial number of examinations daily. A team of this kind would be strengthened by the addition of a sanitary engineer or other person who could deal with problems of environmental sanitation. It should also for preference be based on a suitable institution since both facilities and personnel would then be easier to obtain.

Ordway N (1962) *Bull. Wld Hlth Org* 25 (1 press)
Ord N (1960) *Bull. Wld Hlth Org* 25 (1 press)

different countries and until they acquire meanings that are understood internationally they must inevitably cause confusion

The extent of the problem

Although statistics of the diarrhoeal diseases are far from complete and mortality is probably highest in the countries which have the least reliable statistics existing data are sufficient to show that they are the leading cause of death in a number of countries and particularly affect children under 5 years of age. When they do not kill they cause illness both in children and in adults and are an important source of economic loss. In Yugoslavia in 1952 49% of all deaths in a single paediatric unit in Sarajevo were due to diarrhoeal diseases. At the Dakar maternal and child health centre in Senegal out of 60 186 children examined in 1957 13 428 had diarrhoea and of the 2272 children admitted to hospital by the paediatric service 331 were admitted for diarrhoea. Mortality statistics from the same service for the period July-October 1958 showed that 42.6% of the 977 admissions were for diarrhoea and of these 42.3% died. In Brazil an average of 34.9% of deaths in the Federal District in 1956-1957 were attributable to the diarrhoeal diseases; the percentage was 38.7 in the municipality of São Paulo in 1956 and 30 in the municipality of Recife in 1957.

Even in the developed countries where the mortality figures are low the morbidity is far from negligible as has been shown by investigations in Cleveland Ohio USA and in Newcastle upon Tyne England. In Russia in 1913 40-50% of children admitted to hospital with toxic dyspepsia died. Today by contrast in many children's hospitals and in certain cities the rate is between 1.5% and 2% and for dysentery between 0.5% and 1%. Although the mortality and morbidity rates have fallen greatly and are still falling in the more developed countries there is still some mortality and rather more morbidity.

Causes of the diarrhoeal diseases

While there is a certain amount of information about the part played by *Salmonella*

Shigella and *Escherichia coli* in the diarrhoeal diseases there is very little real knowledge of the relative importance of viruses parasites and malnutrition. How far for example malnutrition is a cause of diarrhoea or how far diarrhoea is a cause of malnutrition it is difficult to say. Indeed for the world as a whole most diarrhoeal diseases are of unknown etiology so that estimates of the relative importance of the causative agents are subject to correction in the light of better statistics and epidemiological information.

As far as can be ascertained now that cholera is limited to a relatively few areas, *Shigella* is the chief pathogenic agent in areas of high diarrhoea morbidity.⁴ As a consequence the prevalence of *Shigella* has been widely employed as an indicator in studies of the epidemiology of the diarrhoeal diseases. Infection with *Shigella* is uncommon in the first six months of life rises rapidly to a peak in the second year then gradually falls. Data from reported epidemics indicate that about two thirds of the cases are attributable to *Shigella*. Second to *Shigella* is *Salmonella*; numerous species being involved. In contrast to *Shigella* the rate of infection is highest in young infants; in a study of children in Texas for example infection with *Salmonella* was found to be double that with *Shigella* in infants whereas in children over one *Shigella* was commoner in the ratio of 7:1. In the past decade a large number of hospital epidemics of infant diarrhoea have been shown to be due to a variety of types of *Escherichia coli* but the importance of this organism in the community still remains to be established. The emergence of *Staphylococcus* as a pathogen may be related to its growing resistance to antibiotics but its role as an agent in the causation of diarrhoeal disease seems to be small. Intestinal parasites are the cause of much illness in the world but do not appear to cause much diarrhoea except perhaps indirectly by their association with malnutrition. Viruses have often been incriminated and in some countries evidence has been produced that some of the enteroviruses may cause diarrhoea but their impor-

immunization may well include protection against typhoid fever but not against shigellosis the vaccine for which has been uniformly unsuccessful

Adequate qualified staff is needed to carry out measures for the treatment and prevention of the diarrhoeal diseases. The Study Group believed that there should be an expansion of maternal and child health services through the creation of medical centres in both rural and urban areas not solely for the management of infantile diarrhoea or for its prevention but as an integral and important part of the total community health programme

The importance of environmental sanitation

The decline of the diarrhoeal diseases during the last century in some countries has been largely attributed to improvements in environmental sanitation. These include the provision of adequate and safe water supplies, sanitary facilities for the disposal of excreta, the prevention of the pollution of ground and surface water supplies by faeces and of the carriage of faecal particles by vectors such as flies, housing with enough space to prevent excessive crowding, the freeing of dwellings from rodents and other vermin and from domestic animals and sanitary control of the production, processing, storage and consumption of milk and other foodstuffs. The mode of spread of the diarrhoeal diseases is essentially by the anal-oral route. Infection may be direct from person to person through fomites through vectors or through the consumption of contaminated water, milk or foodstuffs. Parasitic infestation which may contribute to the diarrhoeal diseases may arise from contact with polluted soil. Animal reservoirs may be of importance in some infections. Environmental sanitation interposes barriers to the spread of infection from all these sources.

Recent studies have shown that a significant improvement in the standard of environmental sanitation may be obtained by certain selected measures. It has for example been shown repeatedly that fly control reduces the morbidity from the prevalence of *Shigella*

infection in children. Should insecticide resistance develop, basic measures must again be used. Flies must be prevented from gaining access to human faeces and their control achieved by the removal of the environmental conditions that favour their multiplication. Studies in the USA and in Guatemala have likewise shown the importance of supplies of safe water in the prevention of the diarrhoeal diseases. The probability that selective modification of factors in the environment will reduce the incidence of these diseases should be tested in a number of geographical areas and in differing cultural groups and the relative importance of the factors assessed but the evidence is already sufficiently strong to justify initiating selective environmental control programmes. Diarrhoeal disease advisory teams should be able to draw on expert sanitary engineering advice.

Research

As indicated, the effectiveness of specific environmental control measures needs critical evaluation and additional observations are required on the effect of increased availability of water on the incidence of the diarrhoeal diseases. Research is needed into the possibility of a mass programme for the prevention of deaths from dehydration and into the early use of oral sugar-electrolyte solutions in episodes of infant diarrhoea. The value of rehydration units in local health centres at some distance from hospitals calls for study. A disturbingly high proportion of diarrhoeal diseases are still of unknown etiology. Among the agents incriminated are the enteric viruses. Because the technical procedures are so exacting and the cost of virological studies so high, investigations must be carried out selectively but they should be carried out as expeditiously as is practical because of the importance of these viruses in the diarrhoeal diseases of animals and because filterable agents have been shown to cause disorders of this kind in man. Other subjects calling for study are the interrelationship of malnutrition and infection in the diarrhoeal diseases and the role of intestinal parasites.

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the international reference centres set up by WHO—the International *Salmonella* and *Escherichia* Centre in Copenhagen the International *Shigella* Centres in London and Atlanta Ga—and the network of national *Salmonella* and *Shigella* centres in identifying organisms in supplying preparations of strains and sera for the purpose of identification and in giving advice on the preparation of typing sera and on isolation techniques. These services do not include the supply of reagents for routine diagnosis or the specification of standardized diagnostic procedures which would be of value in comparisons between the bacteriological data obtained in the different areas selected for special studies. Uniform reagents might be supplied by a central service to national laboratory centres which would be the focus of bacteriological work in each individual study and would redistribute the reagents and give technical advice to the participating field units. In this

way the work done with uniform reagents would yield comparable data on which future recommendations for uniform diagnostic procedures might be based. A limited initial programme like this would form a basis for the future extension of similar services to diagnostic laboratories throughout the world. The supplying laboratory and the national laboratories working in close contact with the field units need not necessarily be those already in the network of international and national centres but close consultation between the different centres should always be maintained.

Further knowledge of the diarrhoeal diseases will require as well the engagement of sufficient qualified staff for the work of investigation and research. Also because many disciplines are involved in the study and control of the diarrhoeal diseases the work must everywhere be co-ordinated to a much greater extent than at present.

A NEW APPROACH TO IMMUNOLOGY

The preservation over many years of collections of human blood will enable the biologists and medical and public health workers of the future to study diseases by reference to present immunological patterns. This bold new approach to Immunology has been described by Dr A. M. M. Payne, Chief Medical Officer, Virus Diseases, WHO, in a paper presented at an International Symposium on Epidemiology held at Prague, Czechoslovakia, from 22 to 27 February 1960 by the Czechoslovak Society of Microbiologists and Epidemiologists. This paper is summarized below.

Epidemiological methods were first applied to the study of communicable disease. Indeed, to many the word epidemiology came to be synonymous with the study of communicable diseases and especially of epidemic diseases in populations. At quite an early stage however epidemiological methods were also applied to the study of certain non-communicable diseases notably nutritional disorders (scurvy, beri beri, pellagra and goitre for example) and certain occupational cancers.

The results of epidemiological studies conducted within individual countries do not always hold good for other countries. Even

within a given country the application of current findings to explain past events or to forecast future trends is fraught with difficulty. And yet it is above all in this direction that epidemiology has its greatest contribution to make.

Two examples drawn from different fields will suffice to illustrate this. If young men continue to smoke cigarettes heavily until later life a considerable proportion will die of lung cancer. They can be warned and with efficient educational measures the risk may be largely averted. Many other forms of cancer may be preventable in a similar way. In poliomyelitis as socio-economic develop-

ment proceeds the risk of the disease occurring in epidemic form increases. Epidemics will inevitably occur sooner or later unless preventive vaccination is introduced. Other virus diseases are also changing their epidemiological pattern owing to man's interference with his environment and when this is so preventive measures must be developed in good time. Epidemiological studies can provide warning of impending trouble.

Studies of this type have resulted in the general acceptance of two principles. First there is the importance of studying change in the behaviour of a disease within a population over a period of time and the relationship of that change to changes in possible ecological factors. Secondly there is the importance of comparing differences in the behaviour of a disease in different populations at the same time so that the influence of race, environment, socio-economic conditions and other factors may be discerned.

There is a third principle which has not perhaps been as widely appreciated and that is the importance of collecting and storing in stable form material relevant to disease problems so that it will be available for study by new techniques and in connexion with new problems that will certainly arise in the future and also help to define the changing pattern of disease in years to come.

WHO has recently studied an approach to the application of all these three principles which has certain novel features. This approach is the subject of the present article.

A branch of epidemiology which has received increasing attention in recent years is *serological epidemiology*. Early examples were the study of Wasserman reactions in different population groups. In the nineteen thirties the first important geographical surveys of the prevalence of antibodies to yellow fever were carried out by the Rockefeller Foundation and resulted in the demonstration of the existence of jungle yellow fever. Later in the nineteen forties serum surveys were used for mapping the geographical distribution of the arthropod borne encephalides and soon afterwards they were applied to poliomyelitis at first using the only technique available at the time—the Lansing

neutralization test in mice—but happily some of these collections were stored and were re-examined later using tissue culture techniques with most rewarding results. For example J. R. Paul and his colleagues using their collection of Eskimo sera were able to show that poliomyelitis antibodies persist in the absence of reinfection for many decades. More recently some investigators have examined the sera collected using batteries of tests thus obtaining information regarding several diseases at little extra cost.

Blood contains many substances other than antibodies the examination of which is of public health importance and of scientific interest. Haematological and biochemical investigations are of great importance in the study of certain chronic diseases including cardiovascular disease and anaemias and of over and under nutrition, human genetics and hereditary abnormalities. WHO therefore convened a Study Group to consider the practical problems of the multi-purpose approach to serological and haematological surveys and in addition to make proposals for the establishment of an international system of serum reference banks so that material collected in these surveys could be preserved under optimum conditions and released for investigations of international significance in the future.

The Study Group which consisted of a statistician, a virologist, a bacteriologist, an epidemiologist, a veterinarian, a biochemist and an expert on abnormal haemoglobins met in December 1958 and its report has now been published.

As far as was possible in the five days of its meeting the Study Group discussed all the major aspects of the subject. Its report contains sections on studies on the blood of man and animals in which survey methods are indicated, the uses and limitations of serological surveys, methods of sampling the population, technical considerations regarding the methods of collection, shipment and treatment of blood for multi-purpose examination, collection of epidemiological information relevant to the survey, recording and reporting results, recommendations for

the development of multi purpose surveys and of international collections of sera and the criteria for the release of such collections for future research

Subjects which lend themselves to study by serological and haematological surveys fall into several categories of which four major ones may be considered immunological studies on the past and present prevalence of infections in man and animals genetic studies such as those on blood groups and abnormal haemoglobins studies of anaemias of various types biochemical studies especially those related to nutrition such as the determination of plasma proteins and cholesterol

For practical reasons two types of survey are envisaged (i) specific surveys initiated to obtain answers to specific problems on to which may be grafted (ii) multi purpose surveys from which information can be obtained concerning two or more of the fields listed above

Thus the team undertaking the survey for a specific purpose would also collect specimens suitable for other determinations and for proper storage of aliquots for future reference conceivably ten to twenty years hence As already pointed out such collections would have great value in the study of the spread of newly recognized disease and in the utilization of new tests which may be devised for previously known diseases (e.g. hepatitis) or which may have a bearing on biochemical haematological or genetic problems

Clearly at first at least the surveys will usually be planned for a specific purpose concerned with some immediate problem It must be shown that a multi purpose survey will not interfere with the primary purpose that it will not seriously increase the cost of the field work that it will not make co-operation of the population more difficult to obtain (e.g. by requiring a disproportionate number of specimens) and that it will yield additional information of value both for immediate and future health problems All this requires a careful study of local problems and interests and careful design of the sampling procedures to suit the various requirements

The report of the Study Group contains a list of conditions on which such surveys could throw light which will be invaluable in persuading local authorities to adopt this new approach

It also contains a section on the uses and limitations of these surveys For example studies of immediate application include the determination of the susceptible groups in a population which may need vaccination and the gathering of information on the geographical distribution of infectious agents which is of obvious practical public health importance to enable the authorities to initiate the appropriate preventive measures

Long term studies may be carried out by repeated cross sectional surveys or by a longitudinal survey in which the same sample of the population is repeatedly examined at appropriate intervals Each of these has advantages for different purposes the former being generally more practical though the latter can be more informative if the serological results are collated with a record of clinical illness covering the same period

It is however necessary to emphasize that serological surveys have their limitations and yield information on only part of the total ecological picture albeit an important part Other investigations will nearly always be needed to complete the story but even so the serological survey will often indicate what these should be and how they should be carried out Difficulties may arise from cross reacting antibodies and from the failure of certain antibodies to persist though the latter may sometimes be an advantage as when the complement fixing antibody indicates recent infection whereas neutralizing antibody in the absence of complement fixation indicates remote infection Lack of reproducibility or sensitivity of the test may cause trouble and introduces problems of standardization of techniques and reagents which are currently being investigated by WHO Difficulties may also be experienced through the presence of non specific inhibitors or neutralizing substances However these disadvantages do not seriously impair the value of serological surveys provided appro

appropriate precautions are taken in their planning and conduct and in the interpretation of the results

The greatest problem associated with multi-purpose surveys as proposed is the method of sampling the population. The Study Group paid particular attention to this point.

In the past there has been a tendency to select a population for a particular survey on the basis of preconceived ideas about the epidemiology of the disease concerned. While it is not suggested that previous knowledge or theory should be ignored in selecting a sample, it is now recognized that the assumption that such theory is fact can introduce a serious degree of bias which will invalidate the results or at least make them very difficult to interpret. It is better to design the survey so as to test the validity of preconceived ideas. In order to do this and to avoid bias even for a survey for a specific purpose, rigorous random sampling procedures must be adopted in the final selection of the individuals to be bled and this is of course essential in multi-purpose surveys.

However, difficulties arise in the choice of areas in a region or country from which the final samples are to be taken. There are two main methods, one being the random selection of areas from the whole region to give a statistically valid sample capable of furnishing objective estimates for the whole population, the other being to choose at random among typical areas from selected and contrasting parts of the region. The latter will not of course give estimates valid for the whole region and averages derived from the findings must be recognized as of uncertain accuracy. However, for most purposes the information will provide a reasonable picture of the general situation throughout the region and the contrasts which become apparent between the different types of area are likely to be much more clear-cut and illuminating than when a random selection of areas from the whole region is made. The reason for this is that many areas randomly selected in this way are likely to be of an intermediate type where the situation is necessarily confused. Furthermore, if the incidence of a condition is

found to be similar in areas selected from contrasting parts of the region, it is reasonable to conclude that it is much the same for the whole region, whereas if it differs markedly the variations are likely to be of more interest than any precise determination of the average value for the whole region.

It should however be emphasized that having chosen contrasting parts of the region, the areas to be sampled within these parts should be selected by some random method and it is useful as an additional precaution to include more than one area from among those believed to be typical of a given set of conditions.

The size of the sample required in a survey depends greatly on the type of information required and the degree of detail hoped for. The report discusses the well known formula for the standard error in quantal determinations which are those most usually used in these surveys. Taking all factors into account, the Study Group considered that a suitable sample size for the population groups between which it is desired to make comparisons is 300-600 and an example is given which has often been used successfully, consisting of 25 samples for each annual age group up to and including the age of 4, 50 samples for each five year age group from 5 to 19, 50 samples for each ten year age group from 20 to 39, and 50 samples from persons over 40. For some purposes the last will be insufficient, and when that is so it would be advisable to continue 50 samples per decade up to perhaps the age of 69.

In deciding the size of the sample required for any purpose, the magnitude of laboratory and other non-sampling errors that are likely to affect the results should be borne in mind. There is no point in using very large samples where these errors are large and cannot be reduced by standardization of techniques and reagents.

The Study Group stressed the importance of including animal populations in these studies. Many human diseases are primarily zoonoses and human infections, though grave, may be ecological accidents of no significance for the survival of the infectious agents. A true understanding of these

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It is however necessary to emphasize that serological surveys have their limitations and yield information on only part of the total ecological picture albeit an important part Other investigations will nearly always be needed to complete the story but even so the serological survey will often indicate what these should be and how they should be carried out Difficulties may arise from cross reacting antibodies and from the failure of certain antibodies to persist though the latter may sometimes be an advantage as when the complement fixing antibody indicates recent infection whereas neutralizing antibody in the absence of complement fixation indicates remote infection Lack of reproducibility or sensitivity of the test may cause trouble and introduces problems of standardization of techniques and reagents which are currently being investigated by WHO Difficulties may also be experienced through the presence of non specific inhibitors or neutralizing substances However these disadvantages do not seriously impair the value of serological surveys provided appro-

prate precautions are taken in their planning and conduct and in the interpretation of the results

The greatest problem associated with multi purpose surveys as proposed is the method of sampling the population The Study Group paid particular attention to this point

In the past there has been a tendency to select a population for a particular survey on the basis of preconceived ideas about the epidemiology of the disease concerned While it is not suggested that previous knowledge or theory should be ignored in selecting a sample it is now recognized that the assumption that such theory is fact can introduce a serious degree of bias which will invalidate the results or at least make them very difficult to interpret It is better to design the survey so as to test the validity of preconceived ideas In order to do this and to avoid bias even for a survey for a specific purpose rigorous random sampling procedures must be adopted in the final selection of the individuals to be bled and this is of course essential in multi purpose surveys

However difficulties arise in the choice of areas in a region or country from which the final samples are to be taken There are two main methods one being the random selection of areas from the whole region to give a statistically valid sample capable of furnishing objective estimates for the whole population the other being to choose at random among typical areas from selected and contrasting parts of the region The latter will not of course give estimates valid for the whole region and averages derived from the findings must be recognized as of uncertain accuracy However for most purposes the information will provide a reasonable picture of the general situation throughout the region and the contrasts which become apparent between the different types of area are likely to be much more clear-cut and illuminating than when a random selection of areas from the whole region is made The reason for this is that many areas randomly selected in this way are likely to be of an intermediate type where the situation is necessarily confused Further more if the incidence of a condition is

found to be similar in areas selected from contrasting parts of the region it is reasonable to conclude that it is much the same for the whole region whereas if it differs markedly the variations are likely to be of more interest than any precise determination of the average value for the whole region

It should however be emphasized that having chosen contrasting parts of the region the areas to be sampled within these parts should be selected by some random method and it is useful as an additional precaution to include more than one area from among those believed to be typical of a given set of conditions

The size of the sample required in a survey depends greatly on the type of information required and the degree of detail hoped for The report discusses the well known formula for the standard error in quantal determinations which are those most usually used in these surveys Taking all factors into account the Study Group considered that a suitable sample size for the population groups between which it is desired to make comparisons is 300-600 and an example is given which has often been used successfully consisting of 25 samples for each annual age group up to and including the age of 4 50 samples for each five year age group from 5 to 19 50 samples for each ten year age group from 20 to 39 and 50 samples from persons over 40 For some purposes the last will be insufficient and when that is so it would be advisable to continue 50 samples per decade up to perhaps the age of 69

In deciding the size of the sample required for any purpose the magnitude of laboratory and other non sampling errors that are likely to affect the results should be borne in mind There is no point in using very large samples where these errors are large and cannot be reduced by standardization of techniques and reagents

The Study Group stressed the importance of including animal populations in these studies Many human diseases are primarily zoonoses and human infections though grave may be ecological accidents of no significance for the survival of the infectious agents A true understanding of these

diseases and their control is impossible without the study of the wild and domestic animal populations concerned and serological epidemiology can contribute much to this

After discussing technical considerations in respect of the methods of collection shipment and treatment of blood specimens for multi purpose examination the Study Group came to the conclusion that for the tests now contemplated a total of approximately 26 ml of blood from each person would be required

1 *Clotted blood*—20 ml producing approximately 10 ml of serum for immunological studies This should be separated on the day of collection shipped cold but not frozen and stored at the lowest possible temperatures preferably -70°C or perhaps even better lyophilized in 0.5 ml or 1 ml amounts in neutral glass ampoules However the optimum method of storage so as to preserve different antibodies has still to be determined

2 *Oxalated or citrated blood*—6 ml 0.5 ml of whole blood being required for haematology and a similar quantity for blood groups Plasma for biochemical tests and packed red blood cells for haemoglobinopathias would be obtained from the remainder of this specimen separation being carried out at the site of collection The packed red cells should be shipped by air at 4°C the plasma if possible frozen on dry ice or if that is not available at -5° to -10°C obtained by mixing salt with ice

These recommendations are of course subject to alteration after further study in practice Every effort has to be made to devise the simplest possible methods compatible with satisfactory results and with the minimum processing at the site of collection A pilot study in this connexion is now in progress in Kenya and plans are being made to study the stability of different types of antibody and other substances under different conditions of shipment and storage

If as is recommended in the interests of convenience and sterility vacutainers are used for the collection of blood both types of specimen can be collected from a single

venipuncture using two separate vacutainers one of which contains oxalate with an adapter for multiple sampling

It is clear that the collection and recording of relevant epidemiological information are much more difficult in multi purpose surveys than in surveys for specific purposes This is doubly true when specimens may be stored and examined perhaps twenty years later It will be difficult to ensure that all information that might possibly be wanted has been recorded A great deal of study will be needed to draw up appropriate forms and devise recording techniques which should be designed for machine processing The Study Group therefore included in its report only the broad headings under which special items of information should be recorded

Few will doubt the potential value of international reference collections of sera if wisely established and administered In the opinion of the Study Group pilot studies are necessary to test the recommended techniques collaborative studies of laboratory techniques must be undertaken to determine which are the most satisfactory simple and reproducible tests and reagents need to be standardized storage methods investigated methods of recording studied and the design of forms punch cards etc undertaken and finally and most important of all the co-operation of specialized laboratory workers and epidemiologists must be enlisted because without it it will be impossible to obtain examine or store material Information should be obtained regarding the collections of sera already held in different laboratories and agreement solicited for the release of suitable collections for the purposes outlined here This will entail sacrifices which some workers will be unwilling to make But the flow of material will be a two way flow in this programme Laboratories contributing material will eventually be able to obtain in exchange other specimens perhaps more suitable for their research programmes The experience of WHO in the influenza programme in which co operating laboratories have willingly sacrificed in the interests of international health their right to study in detail the virus strains which they have

isolated shows that this co-operation can be achieved

The programme in only beginning One of WHO's first steps has been to select two leading laboratories which have long been interested in serological epidemiology to act as international centres at which serum banks will it is hoped eventually be established Professor R. Raska has agreed in principle to the establishment of one such centre in the Institute of Epidemiology and Microbiology Prague The other centre which has been

selected is the laboratory of Professor John R. Paul in the Department of Epidemiology and Public Health at Yale University Other centres will probably be needed as the programme develops

It is hoped that if epidemiologists and microbiologists agree that these ideas are basically sound they will do their utmost to co-operate with WHO and the two international centres in the healthy development of this programme which appears to have great potentialities

BLACK FLIES AND ONCHOCERCIASIS

The flies of the genus *Simulium* usually called black flies or buffalo-gnats in English speaking countries affect man and animals both by their biting habits and by their role as vectors of parasites In large areas of Africa some districts of Central America Venezuela and perhaps other South American countries species of this genus are vectors of human onchocerciasis Over a much larger area including parts of Canada the USA and Europe they are an extreme nuisance because of their biting habits and enormous numbers in the USA for example they used to put a stop to the tourist trade in the Adirondacks between May and July and control measures became necessary in this area *Simulium* has also created difficulties in the exploitation of fertile lands in Africa and Central America not only because of the fear of onchocerciasis and onchocercal blindness but also because to avoid the ferocious biting of the black flies people refuse to work on the construction of dams on irrigation systems or on the land Populations have been forced to emigrate to other areas and depopulation famine soil erosion even social conflicts in territories where the emigrants were not welcome have resulted

Heavy losses among domestic and wild animals have also been caused by *Simulium* Animals have been affected in the river basins of Germany along the Danube in forested parts of Siberia in Australia Canada the

USA and South America and include mules horses cattle sheep hogs dogs cats deer foxes rabbits turkeys chickens and ducks In Romania in 1923 for instance more than 16 000 domestic animals were killed by *S. columbianense* in addition to an unestimated but certainly large number of wild animals

Simulium transmits different parasites to different animals one being *Onchocerca gutturosa* a filarial worm that attacks cattle and causes severe economic losses in Australia Another transmitted protozoiasis affects turkeys and ducks

Different species of *Simulium* appear to have preferences for different parts of the human body The North American black flies are reported to bite man mostly on the upper parts of the body even crawling under clothing and hats to feed The head and upper parts of the body are also preferred by *S. ochraceum* the principal vector of onchocerciasis in Guatemala and Mexico while *S. damnosum* the most important vector in most areas of onchocercal endemicity in Africa bites almost entirely on the legs These preferences appear to be correlated with the distribution of the "nodules" containing the adult *Onchocerca* worms in the person infected In Central America they are chiefly found on the head and upper parts of the body in Africa in the pelvic area and lower parts of the body

Black flies breed in running water and both in Africa and in America control programmes are based on the introduction of such larvicides as DDT into breeding rivers and streams in quantities lethal to the larvae but spraying has also been used in addition against adult black flies for instance in the Adirondacks. Control presents a very different problem in each area. In Quebec and in the Adirondacks the black flies breed in the many streams the country is difficult and the undergrowth dense and roads and trails are absent insecticide is therefore sprayed from the air. In Africa *S. damnosum* is generally a large river species and the breeding places are normally accessible from the ground so that insecticide can be introduced into the main streams the small tributaries which generally are free of the larvae being left untouched. The breeding places of *S. ochraceum* in Mexico and Guatemala are the most difficult to control because the country consists of heavily forested mountains with steep sides covered with almost impenetrable tropical forest. Here aerial spraying is impossible because the insecticide would never penetrate beyond the forest canopy and the inaccessibility of the country and the abundance of streams make it exceedingly difficult to treat the breeding areas with insecticide.

With such different behaviour on the part of the black flies it is not surprising that there are striking dissimilarities in the epidemiology of onchocerciasis in America and in Africa.

In Mexico and Guatemala the disease is associated with coffee growing areas and occurs in restricted zones in forested country between 450 and 1500 m above sea level. In Nigeria the endemic areas have such hazy limits that the term "zone" is inapplicable the disease is not associated with altitude or with plantations and it is found both in savannah and in forest country. In Mexico and Guatemala the distribution of the vector black flies is much more extensive than the distribution of onchocerciasis whereas in Nigeria they are co extensive. Finally the infection rate in the black fly is much lower in Mexico and Guatemala than it is in Nigeria a difference that no doubt is reflected in the number of sufferers from onchocerciasis in the two areas. In Mexico this is estimated at 35 000 50 000 in Guatemala at 25 000 and in Northern Nigeria alone at a third of a million.

The author of an article in a recent issue of the WHO Bulletin¹ who has visited America as a WHO fellow to study black fly control and problems of onchocerciasis concludes from his comparison of American and African conditions that control should be based on a reasonable working knowledge of the biology of the local species which may be different for the same species in different countries and under different conditions. Careful entomological studies are therefore essential for the planning of control measures in each area.

Croskey R. W. (1959) *B. H. Wld. Hlth. Org.* 21 727

Production of live poliovirus vaccine

" even if the current impressions of the safety and (in certain epidemiological situations) the effectiveness of the [live poliovirus] vaccine should be confirmed there are still problems of ensuring the consistent production of a safe and effective product which must be solved before its public health use on a large scale can be advocated. A meeting of an expert committee is planned for 1960 to consider the present position and to make recommendations as to the manufacture and use of the vaccine.

A u l R p t of th D r c t o G r l f W H O
(*Off. R c Wld Hlth Org.* 1960 98 14)

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958

10 Some general trends

A brief mention has already been made of the statistical work initiated by the Health Organisation of the League of Nations which greatly encouraged countries to introduce or to expand systems for the collection and publication of health statistics.¹ It published a series of handbooks on the statistics of a number of countries and sponsored much statistical work on such matters as nomenclature, classification, field studies and the collection and publication of the results of surveys, all of which are dominant features of present day health programmes.

When WHO took the place of the Health Organisation of the League of Nations governments and a number of non-governmental organizations pressed for previous international work to be continued and expanded. It was recognized that sound international health policies and programmes were dependent upon countries providing adequate statistical and other data and upon the application of sound statistical methodology. It has been the purpose of the present review to show how WHO has attempted to meet the demand made on it for services in these technical fields.

At first quite understandably the emergency conditions immediately following the Second World War gave considerable prominence to communicable diseases, malnutrition and dislocation of local health services. Even these emergencies could not be met without the guidance given by health statistics. When this phase passed the role of health statistics became even more important. In most WHO activities during the past ten years planning has come to be seen as dependent upon adequate statistical data and upon a better understanding of the epidemiological factors operating in each country and region.

Conversely the marked gaps in the completeness and accuracy of health statistics in many regions and the incomplete understanding of the epidemiological circumstances of many causes of ill health and disease resulting from this situation have been seen to be a serious obstacle to the efficiency of the health services provided by individual countries.

In the early days of WHO the study of the communicable diseases (such as cholera, malaria and tuberculosis) was predominant. Latterly although epidemiological problems in communicable disease have continued to be exceedingly important greater attention has begun to be paid to the study of non-communicable conditions such as cancer. The work of the League in achieving greater comparability of statistics of incidence and prevalence of cancer from country to country has been continued and expanded by WHO with the help of the national committees on vital and health statistics. Other non-communicable conditions of interest have been circulatory conditions, malnutrition and accidents.

Any proposal made to WHO for an international health programme has usually followed the same pattern. It has been recognized that any assistance to governments is administratively and technically faulty unless its full extent and implications are known. Invariably therefore the technical groups called together by WHO to advise on programmes have requested improved statistical information from countries and asked WHO to arrange for this to be collected and analysed.

Again and again in the period described in the present review the priority to be given to the improvement of national statistical systems has been emphasized. WHO has played a large part in encouraging countries to recognize their responsibility for collecting adequate data on their health conditions.

This is the first part of an account of WHO statistics prepared for the 15th Annual Health Statistics Conference, London, 1959. It is published in the WHO Chronicle 1959 13 67-214. 253 378 417 446 1960 14 66, 116 146.

See WHO Chronicle 1959 13 70.

and to use the procedures and technical methods recommended by the various WHO expert groups. Statistical services in countries are being improved through seminars (conducted usually in co-operation with the United Nations) the visits of consultants and the training of local staff through WHO fellowships. This basic work has been furthered by the appointment of statistical officers to the staffs of four of the WHO regional offices. These experts have helped local administrations to understand the role of epidemiology and statistics in the development of their own national health services.

Much of the work in statistics undertaken by countries individually or in combination would be haphazard or self-defeating but for the procedures, nomenclatures and classifications devised by the WHO Expert Committees on Health Statistics and the International Conference of National Committees on Vital and Health Statistics. Under the auspices of WHO the exceedingly important seventh revision of the International Lists of Diseases and Causes of Death has been prepared and made available to countries through a manual published in several languages.

Another noticeable trend has been the increased willingness of countries to use statistical methods for the more accurate determination of the causes of mortality and morbidity. The detailed lists of the earlier decennial revisions of the International Lists had been recognized as suitable for countries with well-organized statistical systems. In recent years, however, it has been accepted that these detailed lists are of less use to countries lacking proper statistical services. Valuable contributions to the solution of the statistical problems of such countries have been made by the WHO expert committees; they have devised for example short lists and sampling procedures and shown how the analysis of hospital statistics and other morbidity returns could be put to use in obtaining data of value.

This more intensive study of morbidity data is another tendency now noticeable. In the last decade health administrations have found it increasingly necessary to base their

policies on indices of morbidity as well as of mortality if not more so on the former. The difficulties of morbidity statistics have consequently become the subject of study. Recent Expert Committees on Health Statistics have attempted to give some guidance but have recognized that the nature of the subject makes international study of morbidity returns inevitably more complex than the study of mortality returns. Nevertheless several principles have been defined. Some of the conditions have been laid down which must precede the use of morbidity data whether taken from hospital returns or general practitioner records or collected in pilot schemes or experimental areas. Much research work, however, especially under field conditions is required. Here again the national committees are giving much assistance. Modern statistical methodology is of great value in dealing with the problems arising in the use of morbidity statistics and is being made more widely available through training courses (developed by WHO) in the use and limits of small samples in the control of clinical and field experimental studies and in the general techniques of analysing numerical data.

WHO has inherited from the League the obligation to publish the data it receives on mortality and morbidity from a number of important conditions. During the decade these returns have been under constant review and every occasion has been seized to persuade countries to send in more complete and accurate returns based wherever possible on one of the lists given in the latest decennial revision of the International Classification. A further obligation has been to make these data available to all those who may be interested in it. WHO has maintained the regular publication of these reports in complete and inaccurate though many returns from countries have been. The very publication of obviously incomplete returns is arguably a stimulus to better returns being prepared. World data available through WHO publications or in the case of vital statistics in the companion publications of the United Nations are essential for inter-national organizations assisting countries to

organize their health services as well as for institutions and individuals undertaking research into epidemiological and statistical matters of world or regional concern

Numerical data are not the only contributions WHO has been able to make in this field. Equally important is the information collected in specific epidemiological studies or surveys. Epidemiological inquiry it will be recalled from the examples given elsewhere in this present study has increased in prominence in WHO programmes. Many projects launched by WHO in response to requests by governments for assistance now have an epidemiological component for example those dealing with malaria, brucellosis, rabies, trachoma, tuberculosis and such conditions as diarrhoeal diseases, malnutrition and mental diseases.

Data from such projects apart from their use in guiding local programmes are increasingly being added to medical knowledge by publication in WHO technical journals or on occasion in national journals. As the phase of direct assistance to countries in establishing their own basic health services decreases in relative importance this tendency is likely to become more marked. International scientific data will be gathered and published increasingly continuously and regularly for use by technical and administrative groups everywhere.

The modern world depends more and more on a complexity of organization which sets a premium on statistics and there is little likelihood of any decrease in the demand made on WHO for its services in epidemiology and health statistics.

The growing complication of modern industrial and urban life must also make health programmes increasingly dependent upon epidemiological guidance. It is perhaps not going too far to see in many present-day circumstances an indication of the future importance of epidemiology and statistics. Populations whether of humans, insects, parasites or micro-organisms are living changing groups which are continually interacting with each other and in turn being influenced by any variation in their general environment. This being so, no description or analysis of disease in a human population serves for all time: there are too many variable factors existing in the circumstances of any particular disease in a human community ever to justify complacency. Man's conquest of so many of the diseases that mystified and appalled his ancestors has paradoxically presented him with new problems. The reduction in the plagues of the past has unleashed forces the extent of which has still to be revealed. A world contracted in space and made one by technology, industrialization and urbanization is bound to produce new and unpredictable disease patterns. Even if the traditional hazards of such diseases as cholera, plague and smallpox are avoided, there is a distinct possibility of new infections and new hazards, radiation and other emerging. The future role of virus infections is also difficult to predict. Whatever form therefore human communities of the future may take it is unlikely that they will be able to dispense with international health statistics if they desire efficient health services.

Malaria eradication in Europe

Mopping up the last cases is the task facing European malaria workers today. If in 1962, after 11 million square miles have been cleared and 686 million people protected, the eradication of malaria on the European continent will be the first throw off the shackles of the world's most costly disease. Then Europe will be able to devote even more of its scientific and human resources to driving malaria from the other continents.

D. P. L. J. AND CALSEYDE, WHO Regional
Director for Europe

Epidemiological and Statistical Information

LEADING CAUSES OF DEATH IN SELECTED COUNTRIES

Ranking deaths from each cause in numerical order is a popular method of presenting mortality statistics. Though it has its limitations it is the best method for answering the question: 'What are the most frequent causes of death?' and the information obtained is useful in planning action to reduce mortality. The fact that only a few causes of death account for a large proportion of all deaths is of great significance, since specific measures undertaken to reduce mortality due to these causes might considerably lower the general mortality.

In a study published in the WHO *Epidemiological and Vital Statistics Report*¹ causes of death have been ranked on the basis of the average annual (1954-1956) number of deaths assigned to 41 single categories or groups of categories of the abbreviated list of 50 causes of death found in the seventh revision of the International Statistical Classification of Diseases, Injuries and Causes of Death.²

The following countries were selected for this study:

Canada	Netherlands
United States	Norway
Denmark	Sweden
Finland	Switzerland
France	United Kingdom
Germany	Australia

It has been for a long time the practice of these twelve countries to issue statistics of

causes of death.³ They also have good medical services on which adequate registration of causes of death depends so much.

The following interesting facts emerge from the study:

1 The ten leading causes of death are responsible for more than 75% of deaths in the selected countries except in the Federal Republic of Germany and in France where the proportion is somewhat lower being 68.8% in the first and 62.7% in the second.

2 Heart disease⁴ malignant neoplasms, vascular lesions affecting the central nervous system and accidents are the most common causes of death in the selected countries which represent the developed areas of the world today.

3 Heart disease appears as the leading cause of death in practically all countries studied. One quarter to over one third of deaths are due to this cause in practically all these countries except Germany (19.7%) and France (18.1%). Malignant neoplasms are the second most frequent cause of death being responsible for between 14.3% and 21.6% of all deaths. Vascular lesions affecting the central nervous system rank third (11.16%) in all countries. Deaths due to accidents are in the fourth place (4.5-6.9% of all deaths) in all countries except England and Wales, Northern Ireland and Sweden where they rank as the fifth or sixth cause of death.

The following table shows the leading causes of death in the selected countries.

¹ *Epidemiol. & Statist. Rep.* 1959, 12, 109.
² World Health Organization (1957) *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death*, 1955, Geneva, p. 381.

The following table shows the leading causes of death in the selected countries.

Pneumonia is the fourth cause in Sweden and the fifth in England and Wales and all the other countries except Denmark Finland and Scotland where it ranks sixth

The above mentioned five causes of death together account for roughly two thirds of all deaths They therefore indicate the major fields where life might be saved in the population as a whole

By age group

The leading causes of death vary greatly for different age groups

In the age group under one year birth injuries postnatal asphyxia and atelectasis rank first as causes of death Congenital malformations are second and pneumonia is third

In the age group 1-4 years the leading cause of death is accidents in all the countries selected The proportion of deaths caused by accidents at this age is for these countries on the average about 30% of deaths due to all causes and the specific death rate is about 35 per 100 000 population In England and Wales the proportion and the rate are relatively low (21% and 20 per 100 000 population) The same is true for France and Northern Ireland (15.4% and 19.7% 26.7 and 21.1 per 100 000 population respectively) Pneumonia is the second and congenital malformations are the third cause of death in this age group

In the age group 5-14 years as in the previous age group accidents are the first cause of death They are responsible for an average of 38% of all deaths during this period of life in the countries selected though the proportion ranges between 49.6% in Canada and 27.9% in France The death rate varies from 11.8 per 100 000 population in France to 32.0 in Canada with an average of slightly less than 19 per 100 000 population Malignant neoplasms occupy the second place in all the countries selected On the average the proportion of deaths due to this cause is 13.8% of all deaths ranging from 11.4% in Canada to 15.9% in England and Wales The average death rate is 6.4 per 100 000 population with the lowest level 5.7 in Scotland and the highest 7.7 in

Norway Congenital malformations hold third place Pneumonia is in the fourth place in most of these countries nephritis and nephrosis fifth

In the age group 15-44 years accidents remain the most frequent cause of death for all the countries selected except Denmark the Netherlands and the United Kingdom In the first two countries and in England and Wales they are the second most frequent cause and in Scotland and Northern Ireland the third The lowest death rate from this cause is in Northern Ireland (19.8 per 100 000 population) the highest (49.0) in Canada the United States and Australia The proportion of deaths caused by accidents varies from 13.7% (Northern Ireland) to 30.9% (Canada) of all deaths in this age group with a median proportion of 22.5%

Malignant neoplasms generally appear in the second position except in the United States where they rank third and in Finland where they are fourth In Denmark the Netherlands and the United Kingdom they top the list The death rate varies from 23.2 per 100 000 population in France to 32.4 in Scotland with an average of 27.5 Though the death rate is the highest in Scotland yet malignant neoplasms cause only 19.5% of all deaths registered there in this age group The average proportion is 18.1% ranging between 12.5% for France and 25.7% for the Netherlands

Heart diseases do not drop below the fourth place as a cause of death in this age group In the United States Scotland and Northern Ireland they occupy the second The death rate varies from 9.3 per 100 000 population in Norway to 33.0 in the United States causing 7.4% of all deaths in the former and 17.3% in the latter

Tuberculosis appears as the second cause of death in Finland the third in France and the fourth in Norway the Netherlands and the United Kingdom In the other countries it has a lower rank ranging between fifth and eighth

It is interesting to note that suicide and self inflicted injury appear as the third fourth or fifth cause of death in this age group except in the cases of Scotland where it drops to

seventh and Northern Ireland where it occupies the tenth position

Though pneumonia is among the ten leading causes of death in all the countries except Denmark it comes at the tail of the list

In the *age group 45-64 years* heart diseases malignant neoplasms and vascular lesions affecting the central nervous system are the first three leading causes but the order varies in different countries

Heart diseases are the first cause of death in Canada the United States Finland Scotland Northern Ireland Sweden and Australia and the second in the other countries. The lowest death rate is that of France (153.4 per 100 000 population) the highest that of the United States (478.5). Heart diseases are responsible for 13.9% of all deaths in France and 40.4% in the United States

In countries where heart diseases are the first cause of death malignant neoplasms are the second and *vice versa*. Malignant neoplasm death rates vary considerably from one country to the other. Sweden has the lowest rate (220.6 per 100 000 population) and Scotland the highest (340.4). Malignant neoplasms are responsible for between 20.5% and 34.0% of all deaths in the selected countries

Vascular lesions affecting the central nervous system are the third cause of death for this age group in all the countries selected but the death rates vary between 69.4 per 100 000 population in Denmark and 145.6 in Scotland. The proportion of deaths due to this cause also varies between 8% and 12.9% of all deaths

Accidents attain the fourth or the fifth position in all countries but England and Wales where they are sixth

It is interesting to note that bronchitis appears as the fourth cause of death only in the United Kingdom and is not among the ten leading causes in the other countries except in the Netherlands where it is seventh

In the *age group 65 years and over* the same three most frequent causes of death appear as in the previous age group and in general in the same order. Heart diseases cause in some of the countries more than 40% of deaths in this age group (United States 46.5% Canada 42.4% Australia 40.7%). The lowest proportions are in France (22.1%) and Germany (22.7%). In all other countries the proportion is between 30% and 40%

Vascular lesions affecting the central nervous system are second except in the Netherlands and Denmark where they are third. These two causes are responsible for more than half the deaths in this age group

Malignant neoplasms are the third cause (123.192% of all deaths) except in the Netherlands and Denmark where they occupy second place. The three causes just mentioned account for more than two thirds of all deaths

Pneumonia appears again in this age group as the fourth cause in most countries and the fifth in the others (United States Denmark England and Wales Scotland and Switzerland)

Accidents hold the fourth position in the United States Denmark and Switzerland and drop to fifth in the other countries except for the United Kingdom where they are sixth

In this last age group bronchitis comes fourth for England and Wales and Scotland fifth for Northern Ireland

SUICIDE A NEGLECTED PROBLEM

The incidence of suicide is on the whole low in the less developed countries high in the more and in some countries of very high living standards it has become a problem of

considerable proportions. Between ages 15 and 44 it is the second most important cause of death in Japan the third in Germany Denmark Sweden and Switzerland and the

fourth in Canada Australia and the USA. It is also an important cause of death between ages 45 and 64. The table below extracted from recent numbers of the WHO *Epidemiological and Vital Statistics Report* gives the number of deaths from suicide for certain years and the mortality rate per 100 000 population from this cause for one of those years in a number of countries which furnish WHO with statistics on suicide.

	Deaths from suicide (1954-1955)		Mortality from suicide per 100 000 pop. 1 on (1955)
	Male	Female	
Canada	2 637	794	7.1
USA	38 893	10 950	10.2
Japan	39 700	25 500	25.2
Belgium	1 760	658	13.6
Denmark	2 060	1 008	23.3
France	15 983	5 471	15.9
Italy	6 447	4 754	4.8
Norway	607	150	7.4
Netherlands	1 421	743	6.0
Sweden	2 909	941	17.8
Switzerland	2 346	931	21.6
United Kingdom (England and Wales)	9 436	5 889	11.3
Australia	2 176	760	10.3
New Zealand	397	149	9.0

Excludes the case of Belgium (1954-1955) and Italy Sweden and New Zealand (1951-1955).

In the USA some 16 000 people commit suicide every year as compared with 14 000 who die from tuberculosis and 40 000 who die from motor accidents. In England and Wales the number of suicides approximately 5000 annually is nearly as great as the number of those who die from pulmonary tuberculosis and slightly exceeds the number who die from motor accidents. More men commit suicide than women and as age increases the preponderance of male suicides becomes greater.

Durkheim in his classic study of suicide³ divided suicide into three types: the altruistic in which the individual's life is rigorously con-

trolled by the customs and beliefs of a rigid society and he commits suicide for religious or political reasons; the egoistical in which he is insufficiently integrated into society and the anomie in which he is insufficiently regulated by society and his adjustment may be upset by economic catastrophes or sudden wealth. Examples of the first type are to be found in the ritual suicide practised in some primitive societies and in Japan. Social disorganization certainly tends to increase the incidence of suicide and may change the pattern: thus in Hong Kong the disintegration of the traditional culture of Chinese society has led to a shift in the incidence of suicide formerly at its peak in the thirties for men and twenties for women to a new peak in old age for men and during the menopause for women. But an inherent disposition also plays an important part. The stresses of loneliness and friendlessness act with selective severity on those predisposed to mental illness (to depressive psychosis in particular) and these are often the individuals who commit suicide whereas others without the inherent predisposition do not. Cause and effect are not easy to distinguish. Do individuals who commit or attempt suicide drift into isolated environments because of the illness that drives them to take their own lives or are certain environments conducive to suicidal tendencies? Alternatively is loneliness both a consequence of mental ill health and a factor increasing the chances of suicide? The whole problem of suicide is extremely complex: the causes not very well understood.

Further progress in the study of suicide according to Professor Martin Roth⁴ is unlikely until statistical investigations are combined with detailed individual clinical studies along socio-psychological lines of the problems of social integration and cohesion. In these studies aspects on the relative importance of which light needs to be shed are bereavement loneliness poverty awareness of declining faculties decreasing vitality impairment of physical health and mental disease. Others especially in younger people and in attempted suicide are guilt feelings

Epidemiol. & Statist. Rep. 1958 11 364

Epidemiol. & Statist. Rep. 19 9 12, 345

Durkheim, E. (1897) *Le suicide*. Paris.

Bull. World Health Org. 1959 21 577

and a desire for self punishment hopelessness and fear of the future aggressive feelings and the wish not to die but to bring about a change in the attitude of some other person Finally there is the apparent motivelessness of some suicides or attempted suicides linked perhaps with the death wish of Freud Statistical data about suicide are among the most clear cut epidemiological facts in the whole field of psychiatry and should lend themselves to intensive inquiry We might then be able to understand more clearly why there are striking differences in incidence between the more and the less developed countries between communities of

different religious denominations and between urban and rural areas We might also perhaps be in a better position to prevent attempts at suicide and provide those who have attempted but failed with efficient after care or social support And we might be able to decide whether those who actually commit suicide and those who merely attempt to do so are distinct groups of individuals as they sometimes appear to be

Not until comprehensive studies are made of suicide nationally and internationally will it be possible to take the most suitable action to reduce the number of deaths from this cause

SMALLPOX IN 1959

According to provisional notifications about 72 000 cases of smallpox were reported officially in the world (outside continental China) in 1959 as against 243 000 in 1958 (see map) This decline in the total number of cases is due to a decreased incidence in India and East Pakistan where following the unusually high levels of 1958 (about 216 000 cases) only 50 000 cases were notified

However outside India and Pakistan there was little decline in smallpox incidence In the remainder of Asia and in Africa and South America there were about 22 000 cases as compared with 27 000 in 1958

In Europe imported infection from Asia caused 19 cases in January at Heidelberg Germany A case imported from India was notified in East Berlin and an isolated case was registered at Liverpool England In the USSR one case was notified at Termez Uzbekistan

This information is taken from the WHO *Weekly Epidemiological Record* (No 8 1960)

CHOLERA IN 1959

According to a recent number of the WHO *Weekly Epidemiological Record* (No 3 1960) less than 42 000 cases of cholera were officially reported in Asia in 1959 as compared with about 98 000 in 1958

In India the situation was probably the best on record less than 14 000 cases being notified provisionally as against 67 000 in 1958 (see map on page 200) About 60 % of all cases in India occurred in the lower Ganges valley

In East Pakistan about 5300 cases were notified during the first nine months of the year but a sharp rise was recorded in October reaching a peak incidence of about 1400 cases during the first week of November According to provisional telegraphic notifications 20 095 cases (with 12 683 deaths) were reported during the year as against 16 741 (10 623 deaths) in 1958

In Thailand where the disease was present from May 1958 the incidence decreased slowly from the middle of March 1959 and the last cases were reported during the first week in October In all 7777 cases (with 625 deaths) were notified there in 1959

SMALLPOX — VARIOLE

1959

C no. C

1

▲ 2 - 10

■ 11 - 100

● 101 - 500

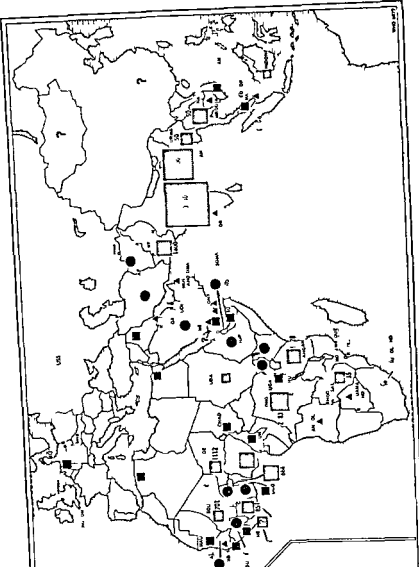
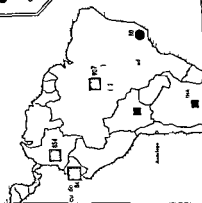
□ ≥ 500

reported

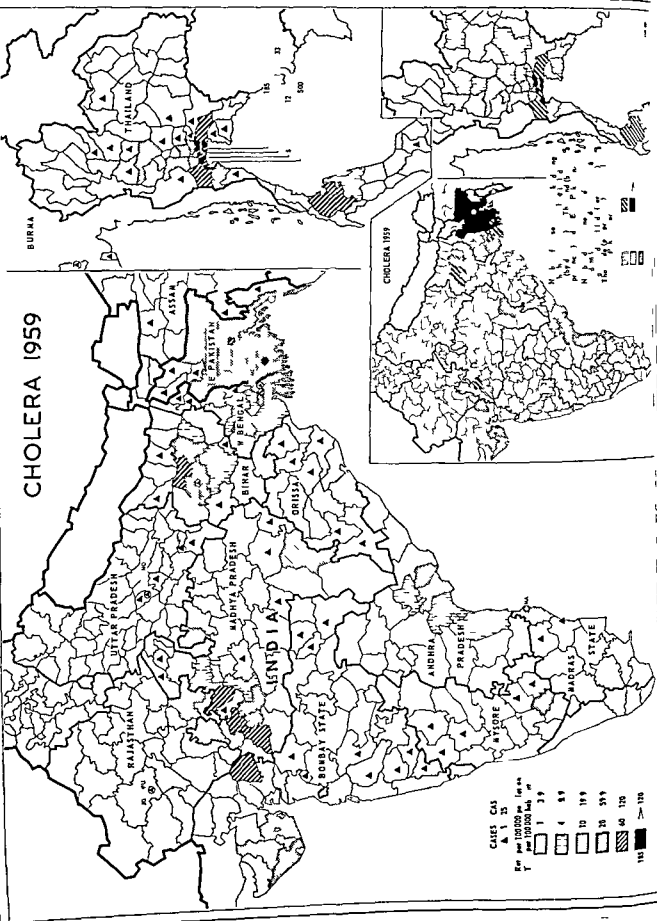
epidemic

see also map of 1958

?



CHOLERA 1959



CASES CAS

▲ 1 25

For pop 100,000 or less

T For pop 100,000 and over

1 25

26 50

51 100

101 200

201 500

501 1000

1001 2000

2001 5000

5000 10000

10000 20000

100

Reports of Expert Groups

The epidemiology of cancer of the lung *

A WHO Study Group¹ met in Geneva in November 1959 to review what is known of the etiology of cancer of the lung and to suggest ways and means of increasing our understanding of the causative factors.

Cancer of the lung is more prevalent than it was. Official statistics in a large number of countries show a steady increase in the mortality and morbidity rates and although part of the increase must be ascribed to a greater awareness of the possibility of the disease and so to improved diagnosis it is generally accepted that most of the increase is real. Even in countries where the mortality rates are still relatively low the tendency is towards an increase.

On the whole evidence is in favour of the assumption that cigarette smoking is a major causative factor in the increasing incidence of cancer of the lung. While some of the criticisms of this interpretation of the evidence suggest avenues for further research none can be considered to cast serious doubt on it. Cigarette smoking cannot however be regarded as the only possible factor of etiological significance. In all countries the incidence of cancer of the lung is higher in urban than in rural areas and much evidence has been adduced to support the view that pollution of the atmosphere by smoke is another factor of possibly great importance to be taken into account. Chemicals known to be carcinogenic to animals particularly 3,4-benzpyrene and other polycyclic hydrocarbons have been found in the air of towns

wherever samples have been analysed. Air pollution appears to have decreased and to be decreasing in many countries and it is desirable that variations in the amount and kind of pollution should be examined before conditions become completely changed. What evidence exists at present on the part played by air pollution in the causation of cancer of the lung appears to indicate that it is or can be a factor of some importance though it appears to be of less importance than cigarette smoking.

While the parts played by cigarette smoking and by air pollution are still hotly debated there is no controversy over the increased risk of lung cancer among certain workers in industry. This was first established in the late nineteenth century for miners of radioactive ores and has been shown to exist for workers engaged in the refining of nickel, the manufacture of chromates and asbestos and the production of illuminating gas. The incidence of lung cancer is also higher among workers exposed to inorganic arsenic (particularly in concentrations sufficient to produce arsenical dermatoses) and it has been suggested that it is increased by exposure to or association with printing ink, iron dust or fumes, the manufacture of isopropyl oil and beryllium and the mining and smelting of copper ore. Although it appears to be unlikely that all the industrial risks of lung cancer have been discovered the contribution of industrial lung cancer to the total incidence is quite small. Nevertheless a more exact knowledge of the conditions under which these industrial processes cause cancer would probably shed light on the mechanism of carcinogenesis in man.

Many other factors have been held to play a part in the causation of lung cancer among them ionizing radiations from non industrial sources, chronic pulmonary disease (especially when it produces scarring and metaplasia) and heredity. Sources of ionizing radiations include the decay products of radium and

WHO Study Group on Epidemiology of Cancer of the Lung (1960). *Report* (World Health Organization, Geneva, 1960). 13 p. Price 1/6 \$0.30. Sfr. 1.— Also published in French and Spanish.

Members of the Study Group: Dr R. Doll, U.K. (Chairman); Professor L. M. Shabad, USSR (Vice-Chairman); Dr H. F. Dorn, U.S.A. (Portugal); Dr M. L. van, U.S.A. (Rome); Professor L. K. Bernstein, U.S.A. (Finland); M. D. Schwartz, France; Professor M. Segi, Japan; Dr E. Walter, United Kingdom; Secretaries: Dr E. Pedersen, Norway (Consultant); Dr J. S. Perera, WHO; Dr B. Furberg, WHO; Dr I. I. E. P. Gossian, WHO (Secretary); Dr P. Sacks, U.K. (Consultant).

thorium radioactive isotopes dispersed in nuclear explosions and radioactive potassium and carbon in the body as well as radiations from diagnostic radiography and radiotherapy and the small amount from cosmic rays. The evidence at present is insufficient to warrant any conclusions about the effect of these forms of radiation on lung cancer.

The same may be said of heredity. Extensive studies of malignant tumours suggest a genetic basis for susceptibility but do not invalidate the evidence accumulated in favour of environmental factors.

There appears to be some evidence of association between lung cancer and chronic bronchitis and mucosal changes in the bronchi but the interpretation of this evidence is uncertain. Retrospective studies have failed to reveal any significant association with healed tuberculosis and follow up studies have not been sufficiently extensive or prolonged to detect one. We do not know what part if any previous respiratory infection plays in increasing the risk of contracting the disease.

Other possible factors that have so far received little consideration are air pollution in dwellings caused by domestic heating and home industry and substances affecting the bronchi that are absorbed from the skin or alimentary tract.

Increasing our knowledge of lung cancer

In different countries there are marked variations in the mortality from lung cancer and in several countries where it was previously infrequent mortality is on the increase. Consequently the Study Group urged there should be high priority for epidemiological investigations into the reasons for variations and particularly into the reasons for the increase in incidence. Special attention should be paid to the extent to which already identified etiological factors may be responsible for this increase.

In some of the countries where the increase in incidence has been marked the frequency of epidermoid and oat cell carcinomas has been observed to have increased disproportionately more than that of the other histo-

logical types of lung tumour. Professor Kreyberg of Norway who has been placed in charge of the International Centre for Lung Tumours established by WHO in Oslo has suggested that epidermoid and oat-cell carcinomas be classified together as Group I tumours and other types of lung cancer as Group II tumours. The ratio of Group I tumours to Group II tumours may as studies already indicate be a sensitive index of an increase in the incidence of environmentally caused lung cancer as between two or more population groups. Where the necessary diagnostic facilities are available the Study Group felt studies of the relative incidence of lung cancer should be undertaken by means of the histological techniques developed by the International Centre. Studies are particularly needed in areas where vital and health statistics are not available or where there is reason to believe that lung cancer has begun to increase. The value of these studies would be much enhanced by the simultaneous collection of data about known or suspected etiological factors. As representative a sample as possible should be taken of cases in a defined population or area one way of securing this being to obtain data on all new cases diagnosed during a specified period of time.

In some parts of the world where reliable vital statistics are not available medical care and diagnostic facilities may be sufficiently developed for special morbidity studies of lung cancer like those on the incidence of cancer among the Bantus of South Africa and among negroes in Uganda and Mozambique. Information about newly diagnosed cases and possible etiological factors can be obtained from doctors, pathologists and hospitals. This type of study has the advantage that incidence rates are obtained for cancer of each specific site as well as for all forms combined and the further advantage that the information is about populations as yet unaffected by modern industrial conditions.

Even between countries in which the increase in the incidence of lung cancer began some time ago there are large differences in rates of incidence. While this is possibly explicable in some cases on the ground that

habits of life and extent of industrialization are different this explanation will not account for the variations between countries where conditions are more or less similar such as Finland and Norway. In Finland the death rate from cancer of the lung is about five times as great among males as in Norway nearly twice as great among females. Epidemiological studies should be made of factors that may influence these variations.

Only in exceptional circumstances is it possible to conduct planned experiments on human beings to test hypotheses about the etiology of a disease. Clearly because of the danger to health and because observations would be required over a period of years they could not be carried out for cancer of the lung. In default of experiments groups of people might be identified and studied who for some reason or other are exposed to an excessive degree or on the contrary are hardly exposed at all to a factor thought to influence the incidence of a disease. Do such groups exist for cancer of the lung? At least one does in the shape of the Seventh Day Adventists in the United States of America a religious sect which is prohibited from drinking alcohol or smoking tobacco. There is at present a study being made of several thousand Seventh Day Adventists in parts of California where air pollution is a major problem. Similar groups undoubtedly exist in other parts of the world and there are also groups of persons particularly exposed to a specific agent workers exposed for instance to the exhaust fumes of gasoline or diesel engines or to the distillation products of coal. In studies of these groups information must be obtained on the incidence of lung cancer in the population of which they form part so that a comparison can be made with the general population and the groups must be large enough to yield a sufficient number of cases to make a comparison possible. In many countries studies would be facilitated if the primary site of cancer were entered in social insurance and pension records for industrial workers which already usually contain information on occupation.

Cancer of the lung is believed to be caused by multiple factors so that the simultaneous

study of these factors in populations known or thought to be significantly exposed to them is a valuable approach to the problem of etiology. It should be borne in mind that current cases of lung cancer are probably due to agents operating twenty to forty years ago information is therefore needed on the time individual members of the group were first exposed to the separate factors to be studied which would include air pollution the use of tobacco (particularly in cigarettes) and occupational hazards. Widely contrasting environments should be represented co-operation should be available from an agency with qualified personnel reliable mortality statistics by age and sex must exist more than one city in each country or cultural area should be included and the mobility of the population in each city should be taken into account. Provided that standard techniques are agreed upon the analysis of air pollution can be carried out in more than one laboratory.

While exogenous factors appear to be responsible for the increase in the incidence of lung cancer genetic traits may at least in part determine who will develop the disease. Genetic studies of twins may also throw light on the role of environmental agents. International collaboration would obviously be needed for studies of twins to produce an adequate number of cases.

Epidemiological studies of a disease like cancer of the lung as a rule single out general factors that affect the incidence the identification of the specific agents responsible being carried out by laboratory and experimental investigation. This investigation the Study Group felt must be encouraged and it stressed the desirability of standardizing laboratory and experimental methods and of conducting experiments whenever possible under conditions reproducing the manner of exposure of a human population.

Although much remains to be done in elucidating the causes of the disease the Study Group held the opinion that there is sufficient well-established knowledge of the etiology of cancer of the lung to justify prophylactic action aimed at the reduction of exposure to known etiological agents.

Insecticide resistance and vector control*

The tenth report of the WHO Expert Committee on Insecticides¹ is essentially concerned with practical problems involved in the combating of insecticide resistance especially with the establishment of standard test methods for determining the susceptibility or resistance of insects. Some modifications have been introduced in the procedures for adult and larval mosquitos on the basis of experience gained so far. It is recommended that the existing standard method for body lice should continue to be used for the present but that two alternative methods which may show certain advantages should be submitted to trial. Provisional test methods have been drafted by the Committee for bed bugs, fleas and sand flies and it is recommended that these should be tested extensively in the field. Tentative methods were also considered for black fly larvae, tsetse flies and cone nosed bugs but these

have not yet been developed to the point where provisional methods can be drafted. In the bio assay of insecticidal deposits on wall surfaces, extensive trials have shown the conical exposure chamber to be superior to the dish type and its use in the standard method is therefore recommended.

The report discusses the definition and use of the term 'behaviouristic resistance'. In the strict sense this should be reserved for populations the behaviour of which has been changed by selection in avoiding lethal doses of an insecticide. It has been more loosely applied to the increased irritability to DDT shown by certain insect populations.

A suggestion that pyrethrum might be a useful alternative to chlorinated hydrocarbon insecticides in cases of resistance was examined by the Committee. Owing to its short residual effect its value is limited to situations where a rapid knock down and transitory control are all that is required and it was agreed that for the present it would be sufficient if up to date information on the role of pyrethrum in vector control be made generally available.

The eight annexes to the report include in addition to detailed methods for detecting and measuring resistance a revised version of Recommended methods for vector control.

WHO Expert Committee on Insecticides (1960) *Tenth Report*
1. *Ins. t. id. s. t. nc. d. ct. o. t. l. (Wild Hlth. Org.)*
2. *h. n. r. p. No. 191. 98 p. g. s. P. ce. 3/6 \$0.60 o.*
3. *bw. r. f. 2— Al. l. bl. F. ch. d. Span. h.*

Members of the Committee: D. S. A. J. H. J. P. Dr. J. R. B. v. Un. t. d. K. g. d. m. (Chairman) Dr. J. H. m. R. p. bl. of th. Uppet. V. l. t. D. R. P. l. d. (V. c. Chairm.)
D. H. F. Schoof USA (R. pp. t.) Sec. tar. t. D. A. W. A. B. own. Ca. d. (Co. li. t.) D. R. W. F. y. WHO M. C. G. r. t. Jo. WHO Dr. M. G. q. t. WHO M. K. U. m. a. WHO Mr. J. W. W. ght. WHO (S. cr. t. ry) D. J. d. Z. l. t.

Notes and News

Transport of gonococcus cultures

Until the beginning of the Second World War the culture method was not extensively used in the diagnosis of gonorrhoea being confined to places where the clinical services had associated laboratory facilities. Then the rapidly increasing incidence of the disease particularly among soldiers made better diagnosis and control desirable. As microscopical diagnosis was difficult it became necessary to use the culture

method to a greater extent than before. This has frequently meant the long distance transport of samples to the diagnostic laboratories.

The transport of material to be tested for the growth of gonococci presents special problems of preservation. Desiccation and exposure to sunlight must be avoided and the consistence, composition and pH of the transport medium cannot be left to chance.

Over the past twenty years various methods have been advocated for the transport of gono-

cocci in conditions that will ensure their survival. In a report recently presented to the WHO Expert Committee on Venereal Diseases and Treponematoses Alice Reyn B Korner & M W Bentzon review the principal methods published and give the results of comparative trials of two of them the McLeod and Stuart² methods. In these trials natural clinical specimens and artificial specimens prepared with pure gonococcus cultures were used. Transport conditions varying in nature and duration were simulated.

The comparison showed the superiority of the Stuart method, which involves the use of a non nutrient medium. This medium can also be used for the transport of other bacteria. To avoid the inconvenience of a semi fluid medium, the authors increased the agar concentration—to 1/2 for Bacto agar and to 1/8, for Japan agar.

Psychotropic drugs and psychotherapy

Do psychotropic drugs help in individual psychotherapy? R.A Sandison writing in a recent issue of the *British Journal of World Health Organization*³ is of the opinion that they do. Jung, he says, condemns the use of these drugs on the ground that they diminish the patient's power to integrate unconscious material. Others hold the view that if tranquilizers are used the patient's anxiety and aggression which would otherwise force him to continue treatment, are reduced to the extent that although not cured he stops the treatment. Against these arguments Sandison maintains that it is by no means clear that tranquilizers do produce a true fall in the total aggressive drive of the individual. Many patients receiving mild tranquilizers experience an increase of energy and creative ability following a reduction in their anxiety and tension. Because less preoccupied with their symptoms too these patients may be better able to take part in their own treatment. No doctor would refuse analgesics to patients in pain. There seems to be some

inconsistency between the willingness to reduce pain and the unwillingness to reduce anxiety tension and insomnia.

Some of the tranquilizers are valuable in individual psychotherapy because they enable the patient to discuss his situation in a relaxed frame of mind. He talks more easily and memories on the fringe of consciousness make their way into speech so that an emotionally charged complex may be uncovered. Where psychological trauma has been recent the drugs may bring about abreaction. Major tranquilizers particularly the phenothiazines are successfully used in the long term maintenance of schizophrenics. Sandison has treated a number of schizophrenics in this way mostly with chlorpromazine and some are in their fourth year of treatment and the majority are out of hospital. In his view chlorpromazine keeps thought disorder under control thus preventing the resultant affective disorder if it is given to an acute psychotic the thought disorder and hallucinations clear up first, then the affective disorder. On moderate doses of chlorpromazine schizophrenics can thus be treated as out patients even though the schizophrenia is at a fairly advanced stage.

Another drug Sandison discusses at length lysergic acid diethylamide (LSD) is not a tranquilizer at all but a hallucinogenic drug. The value of abreaction in treatment is a matter of controversy. A dangerous or frightening experience in which an adult is unable to express his fear as for example in battle may become the starting point of a neurosis. Under the influence of drugs he may relive the experience which this time may be accompanied by the appropriate emotional response. This abreaction may have a good effect on the condition. Whether or not the psychologically traumatic incident has been forgotten the value of abreaction lies in the release of the emotion with which it has become associated. The incident being reassessed in the light of the patient's mature emotional judgement. LSD appears to Sandison to be the most suitable agent for bringing about abreaction.

Sandison also discusses the role of the tranquilizers in group psychotherapy.⁴ Some patients he found who might have been forced to give up LSD treatment were undoubtedly helped to

¹ O published origin documents INT/VD 19
Stuart R D (1946) *Glass med J* 27 131 Stuart R D
(1956) *Canad publ Hlth J* 47 11 Stuart R D Tothack, S. R.
A P is 12, T M (1951) *Canad publ Hlth J* 45 73
Bull Wld Hlth Org 1959 21 495

continue because they were being treated in a group

The psychotropic drugs thus have some therapeutic value although the indications for their use—Sandison emphasizes—are as yet imprecise. Most clinical trials give results that are too favourable to the drugs under test. One reason is that the spontaneous improvement rate of a similar untreated group of patients is not accurately estimated. Another is that methods of measuring improvement are inadequate and vitiated by the observer's conscious or unconscious bias. A third is that the trial is influenced by the placebo response. Sandison's opinion is that a better knowledge of the psychotropic drugs will be obtained if trials are properly designed and controlled and use the double blind procedure and appropriate rating scales. The pressure exerted by drug manufacturers on clinicians to carry out rapid clinical trials should be resisted at all costs: patients should be placed on placebos for weeks or months before the drug is introduced. Editors of medical journals should insist that authors use the drug for at least a year before submitting a paper on it for publication. The first few trials at any hospital should be regarded with suspicion because of the placebo response. Group meetings should be held in wards where clinical trials are proceeding and the attitude of the staff and patients ascertained for all the uncertainties and errors of the trials lie within the emotional lives of the staff so the effect of the size of the staff and of the training and the personality of each of its members must be assessed and a study made of the patients' daily lives and the comparative frequency of parole and leave. The evaluation of all these factors is an extremely difficult task. Nevertheless until more objective studies of the social factors influencing a clinical trial are published along with the results of the trial not enough will be known about the real efficacy of the drugs and physicians will continue to be bewildered by their alarming profusion.

Typhoid vaccine antigens

The strictly controlled field trial of typhoid vaccines in Yugoslavia in 1954-55¹ was the first of a series of trials aimed at determining the

protective value of typhoid vaccines and finding a laboratory test that would enable the immunizing potency of a vaccine for man to be assayed on animals. One of several important questions requiring an answer was that of the respective roles of the H, O and Vi antigens of *Salmonella typhi* in immunization.

In two articles which will shortly be published in the WHO Bulletin² Standfast compares the results of potency tests on the typhoid vaccines used in the trial which were carried out at the Lister Institute of Preventive Medicine, Elstree, England, the Central Institute of Hygiene, Zagreb, Yugoslavia, and the Walter Reed Army Institute of Research, USA.

These tests showed that the results of vaccine assays in mice by the methods at present in use were unsatisfactory. Responses in humans showed differences between the various vaccines which could not be distinguished in the assays in mice. The reason for this may be that protection in man depends on quite different factors from protection in mice. It appears that in their present forms mouse tests do not even measure the essential protective antigen whatever that may be.

While the administration of vaccine in various ways to mice was unhelpful in classifying vaccines according to their potency, agglutination tests showed that the H antigenicity of the phenolized vaccines was markedly higher than that of the alcoholized vaccines which had shown themselves considerably less potent in the field trials.

Tests of the immunological properties of a number of strains of *S. typhi* showed that it is possible to protect mice against Vi positive strains of *S. typhi* by means of a strain without Vi antigen (strain T 5501). This strain is stable and able to maintain its Vi negativity after several mouse passages whereas other Vi negative strains revert to the Vi positive state after one or a few mouse passages. The immunity conferred by the live T 5501 vaccine is as lasting as that conferred by a killed vaccine containing the Vi antigen. While the killed T 5501 vaccine also confers immunity it is not as satisfactory as a killed Vi positive vaccine. These findings confirm those of other studies which suggest that the Vi antigen might not be the essential antigen for protection against typhoid fever.

Standfast A. F. B. (1960) *Bull. World Hlth. Org.* 23 (In press)

Bornholm disease in Upper Silesia

In the summer of 1957 a small epidemic of Bornholm disease broke out in Bytom, Upper Silesia, Poland. The epidemic cases differed from the sporadic cases of the disease that had occurred in previous years both in clinical development and in causation. The chief symptoms in the epidemic were severe pain in chest and abdomen, headache, vomiting and sweating; the commonest complication was dry pleurisy. In a recent issue of the WHO Bulletin K. Gibinski et al. describe some of these cases and the results of virological analysis.

Whereas the earlier sporadic cases had been caused by a type A Coxsackie virus, those of the 1957 epidemic were due to type B. Of the cases studied virologically 30% had been infected with Coxsackie virus of type B, as was shown by neutralization tests in tissue cultures. Complement fixation tests confirmed these results. No type A strain was isolated during the epidemic among the 107 cases diagnosed. The viruses were isolated from the stools and from throat swabs, and only on HeLa cells; the strains were non-pathogenic to newborn mice.

A fresh examination in tissue culture of Coxsackie strains isolated from the earlier sporadic cases confirmed that they belonged to type A.

Thus, within a short time, a change occurred in the type of virus circulating in the population.

Endemic goitre in Basutoland

A survey has been made by a WHO nutrition team of the prevalence of endemic goitre in Basutoland. Some 13 000 people of both sexes and all ages were examined, representing about 7% of the population. Goitre development was assessed according to the criteria established in 1953 by the Third FAO/WHO Conference on Nutrition Problems in Latin America. Of those examined 46.6% belonged to the age group 11-45.4% to the age group 13-18, and the rest to older groups.

The survey showed that goitre exists throughout the whole country. The prevalence varies in

the different districts, but is everywhere well above the 10% at which endemic goitre is generally accepted as constituting a public health problem. Indeed, for the whole territory the average is 41%. The percentage of cases increases with age, regardless of sex, and diffuse goitre is more prevalent than nodular. The population regularly and at times in large quantities consumes foodstuffs thought to be goitrogenic, but eats very little salt (at most 5 g daily). The high incidence of goitre in the age group 0-17% associated with a consumption of foodstuffs that are possibly goitrogenic shows that the level of iodization should be raised above the 150 µg generally recommended as a daily dietary allowance. Experience in Canada, the USA and Latin America has shown that 650 µg of potassium iodate added to a daily salt consumption of 6.5 g per head prevents endemic goitre, and no iodine intoxication or cancer of the thyroid has been reported with this intake. In Basutoland, therefore, with an average consumption of 5 g of coarse salt per head per day, a level of iodization should be recommended at not more than one part of potassium iodate to 10 000 parts of salt, and not less than one to 20 000 parts.

A report on this survey appeared in a recent issue of the WHO Bulletin.

Scientists engaged in research on drinking water quality

In February 1960 WHO published its third list of scientists engaged in research on drinking water quality. It contains the names of 184 persons from 27 countries working on 247 research projects, together with an addendum containing names just received as the list was ready for distribution.

The list is in two parts. Part I contains an alphabetical list of scientists together with descriptions of the research projects on which they are working. Part II contains a list of the subjects recommended for study by the WHO Study Group on International Standards for Drinking Water, under each subject are listed the names of workers engaged on research

connected with it. In each case full particulars on the scientist and the exact nature of his research can be found by referring to Part I.

One of the chief values of this document is the opportunity it affords for those engaged on related research but in different laboratories to get into direct touch with each other. Copies of the list are obtainable on request from the Division of Environmental Sanitation, WHO Headquarters, Geneva.

Nursing in the Americas

At the invitation of the Government of the Argentine Republic and under the auspices of WHO, a Regional Congress on Nursing was held from 25 to 31 October 1959 in the Faculty of Medicine of the National University of Buenos Aires. This congress, the fifth of its kind to be held in the Americas, was attended by representatives of nearly all American countries.

The main topic discussed was nursing legislation. It was pointed out that as nursing is extremely important from the point of view of human well-being, there is a need for nursing legislation which will at the same time protect the community and regulate professional training, practice and administrative control. Such legislation should be general in character and sufficiently flexible to be adapted to social changes. As a first step, a strong, well-organized national nursing association should be set up in each country. These associations would have to have the necessary financial means and legal status, and all professional nurses would have to belong to them.

One of the main subjects of legislation should of course be the professional training of nurses and auxiliary nurses: the minimum requirements at each level of training should be stipulated, taking local possibilities and needs into account. The provisions should, as far as possible, conform with international criteria.

Attention was drawn to the need for setting up—within the competent official body in each country—a committee composed of qualified professional nurses which would be responsible for the administrative control of nurses and for the application of the legislative provisions. There should be precise regulations governing the

functions of each category of nursing staff, beginning with the higher nursing posts in the public health services which should be filled by competitive examination. An administrative control body should be established to keep a register of active personnel and to issue and renew diplomas.

Finally, in order to strengthen national nursing associations, it was recommended that more information be circulated on the aims and rules of these associations. In the first place, the public should be made aware of the importance of the nursing profession and the need for an increasing number of professional nurses. Secondly, nurses should maintain close contact with other nurses in their own and in other countries and keep abreast of scientific progress affecting their profession. Both these aims could be achieved by the creation of a nursing information journal for the Americas.

International courses on radiation protection

During March and April, the WHO Regional Office for Europe assisted in two international courses on protection from atomic radiation held in the Federal Republic of Germany and in France. The first, which took place at the Radiological Institute of the University of Freiburg im Breisgau from 2 to 25 March, was an introductory course on the public health aspects of radiation protection. WHO fellowships were granted to 11 public health officials from Austria, Czechoslovakia, Italy, Romania, Turkey and Yugoslavia to enable them to attend the course.

The second, held at Saclay, France, from 7 March to 15 April, was an advanced course on radiation protection for public health officials. It was organized by the French Commissariat à l'Energie atomique and 14 WHO fellows from Austria, Belgium, Bulgaria, Czechoslovakia, France, Italy, Luxembourg, Poland, Portugal, Romania, Spain, Switzerland and Turkey attended.

These courses were part of a series organized by the WHO Regional Office for Europe starting in 1955. The earlier courses were held at Stock-

holm (1955) Mol Belgium (1957) Oxford/Harwell (1958 1959) and Saclay (1956 1958 1959)

World Health Day 1960

World Health Day this year is devoted to the world's most costly disease malaria and the world campaign for its eradication.

Never before in history have the nations concerted their efforts on such a scale against a single disease. Without a dissenting voice the ninety Members of the World Health Organization have resolved to pool their knowledge and resources to achieve nothing less than the complete elimination of this disease from our globe.

Malaria remains in 1960 a constant threat to more than 1000 million human beings. For the most part these are people who already have more than their share of sickness and poverty and can least afford to be further weakened in their struggle against misfortune.

Today we know how malaria is transmitted and by what mosquitos. We know how the malaria parasite behaves within the human body and how it causes a fever that may lead to death. We have found effective ways of destroying the

mosquitos and we possess drugs that successfully attack the parasites within the human body. The techniques for fighting malaria are continually becoming more powerful and precise.

But we know also that the deadly mosquitos have found ways of fighting back—that is why speed is essential. The campaign against malaria must be carried through while the weapons still remain effective. There must be no slackening of effort until the disease has been entirely stamped out and the last remaining case in the remotest corner of the earth has been tracked down and cured.

There is no doubt in my mind that the countries of the world are today in a position to accept this challenge. To do so indeed is a question of honour. What is needed more than anything else is the will to eradicate malaria for today the way is there.

The above statements are taken from a special message issued by Dr M C Candau, Director General of WHO in connexion with this year's World Health Day which had as its theme

Malaria eradication—a world challenge. World Health Day is observed each year on 7 April to mark the anniversary of the coming into force of the Constitution of the World Health Organization in 1948.

People and Places

WHO assistance to Morocco in Agad disaster

Dr Melville Mackenzie, formerly director of the epidemiological services at the Ministry of Health London, has been appointed by the WHO Regional Office for Europe as adviser to the Government of Morocco on the organization of post-emergency health services in the earthquake-stricken port of Agadir.

Dr Mackenzie was a member of the Health Committee of the League of Nations and has been concerned with epidemic control in Russia (1919-3) in Greece (1918-29) in China in the eastern Mediterranean area, and in London during the Second World War. He was Chairman of the Committee which set up UNRRA (the United Nations Relief and Rehabilitation Agency). On several occasions Dr Mackenzie led the

United Kingdom delegation to the World Health Assembly; he was Chairman of the WHO Executive Board at its twelfth and thirteenth sessions (1953-54).

Technical discussions at Thirteenth World Health Assembly

The technical discussions at the forthcoming Thirteenth World Health Assembly will be concerned with the role of immunization in the control of communicable disease. Professor R Cruickshank is helping WHO with the preparations for these discussions in which delegates from some 80 Member States are expected to take part.

A preliminary questionnaire prepared by Professor Cruickshank has been circulated to all

Member States and interested organizations. In addition Professor Cruickshank had taken part in preparatory meetings organized by the WHO Regional Offices for Europe and South East Asia and by the International Children's Centre Paris. As a result of these activities a considerable body of information has been collected this will be analysed and collated by Professor Cruickshank and used in a background document for the guidance of participants in the discussions.

Professor Cruickshank was appointed to the Chair of Bacteriology in Edinburgh University in 1958 having held a similar post at St Mary's Hospital Medical School University of London from 1949. From 1949 to 1956 he was first Deputy Principal and then—on Sir Alexander Fleming's retirement in 1955—Principal of the Wright Fleming School of Microbiology London. Throughout his career he has made a special study of immunology and the epidemiological and laboratory aspects of communicable diseases and their control. As a member of various scientific committees of the Medical Research Council of Great Britain and the Ministry of Health for England and Wales he has helped to organize and direct controlled trials of prophylactic vaccines and of chemotherapeutic substances in tuberculosis whooping cough influenza typhoid fever and other infections. He has undertaken a number of assignments for WHO and last year he was Chairman of the WHO Scientific Group on Vaccine Research convened under the intensified WHO programme of medical research.

Medical supplies in West Bengal

Mr J. E. Williams of the United Kingdom has been assigned by WHO to advise the Government of West Bengal India for a period of three months on the purchase storage distribution and estimation of requirements of medical supplies.

Mr Williams is Supplies Officer to the United Bristol Hospitals England and a member of the Pharmaceutical Society of Great Britain. In 1952 he undertook a two year assignment for WHO as medical stores management officer in Ceylon returning there for a short follow up visit in 1958. In 1957 he served in Afghanistan

as WHO short term consultant to the government on the storage and management of medical supplies.

Health education appointment

Mr Gerald Specter of the United States has recently been appointed WHO Health Education Adviser in Patna India. The assignment is for two years and among other responsibilities, he will advise and assist the government in developing a health education bureau in the State Directorate of Health Services. Mr Specter has had considerable public health experience and has been working with the Philadelphia Tuberculosis and Health Association as Director of the Health Education Department.

Community development in India

Dr Josef E. Wingren of Finland has been appointed WHO public health adviser to the health programme in the State of Bihar India. The aim of this programme and of similar programmes in other Indian states is to integrate rural health services into the over all national community development programme.

Dr Wingren obtained his medical degree from the University of Helsinki and holds a Diploma of Tropical Medicine from the Institut Tropical, Antwerp. For the past five years Dr Wingren has been Chief Public Health Officer of the Municipality of Jakobstad Finland.

Leprosy in Ethiopia

Dr Michel Lechat recently visited Ethiopia as WHO short term consultant to the leprosy control and training programme now being carried out in that country with help from WHO and UNICEF. This programme provides outpatient treatment through small stations covering limited areas of high incidence under qualified supervision from central leproseries and the training of local personnel for the extension of this work. The total number of leprosy cases in Ethiopia is estimated at 200 000.

Dr Lechat is at present Director of the Leprosarium of Yonda Coquilhatville Belgian Congo where he has greatly contributed to the physical rehabilitation of leprosy patients.

WHO CHRONICLE

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WORLD HEALTH ORGANIZATION

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Dr Lechat is at present Director of the Leprosarium of Yonda, Coquilhatville, Belgian Congo, where he has greatly contributed to the physical rehabilitation of leprosy patients.

THE WORK OF WHO IN 1959

During 1959 WHO took part in more than 500 health projects in some 140 countries and territories alone or in co-operation with other agencies. In addition to this direct help the Organization provided international technical services in such fields as medical research, atomic energy in relation to health, biological standardization, pharmacology and health statistics. In his latest annual report Dr M. G. Candau, Director General of WHO, refers to the general background against which this work was carried out: a background of reduced tension in international affairs, of substantial improvement in economic conditions throughout the world, particularly in Europe, and of growing evidence of the determination of world leaders to devote more of their countries' resources to raising the living standards of nations that are still in the early stages of technological and economic development.

The world-wide malaria eradication campaign remained in the forefront of the Organization's activities.

In December 1959 about 568 million people were being protected by operations which had reached the attack or consolidation phase, while preparatory or pre-eradication surveys were being undertaken for an area inhabited by about 168 million people. Eradication work was extended to the whole of India, the largest malarious country in the world. The second largest India has begun the implementation of a programme which was recently drawn up. While the third largest, Pakistan, a pre-eradication survey was initiated, the fourth, Brazil, started country-wide eradication project to be carried out in stages and using chloroquinized salts as the main weapon in the most difficult areas of the country—the Amazon Valley. Moreover, most of the countries which were already engaged in

eradication work have concentrated during the year on improving operations where necessary. The concern of all regional committees for the objective of eradication is exemplified by the resolution adopted by the Regional Committee for Europe which provides for a co-ordinated plan designed to bring eradication programmes to the consolidation phase in 1960 and all the remaining malarious areas of continental Europe.

Despite the relatively short period—three years—during which the world-wide malaria eradication programme has been in operation, more knowledge has been accumulated in this health field than in any other, and the programmes in operation cover all the continental malarious countries of the Americas, Europe and South East Asia. The following list shows the programmes in operation in these and other regions last year.

COUNTRIES AND TERRITORIES IN WHICH MALARIA PROGRAMMES WERE IN OPERATION IN 1959

African Region

Eradication in Progress

Mauritania	Union of South Africa
Rhodesia	Zanzibar and Pemba
Swaziland	

Pre-eradication Survey

British Somaliland	Togo
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Pilot Projects

Cameroon	Republic of Senegal
Republic of Dahomey	Southern Rhodesia
Ghana	Uganda
Liberia	Republic of the Upper Volta
Nigeria	

World Health Organization (1960) *The work of WHO 1959 annual report*. Geneva: WHO. 108 pp. Price 10/- \$ 00.
 1960, Gen. 4, 183 p. Price 10/- \$ 00.
 5/- 6/- Published in English, French and Spanish.

Tras el examen de la administración durante el período

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

YAWS ERADICATION WORK

INITIAL SURVEYS BY WHO
REGIONS 1950-1958

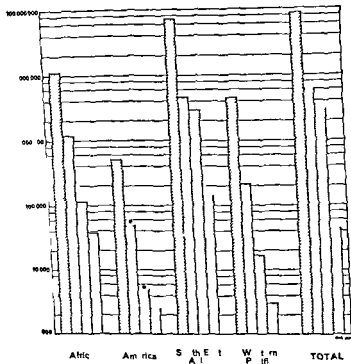
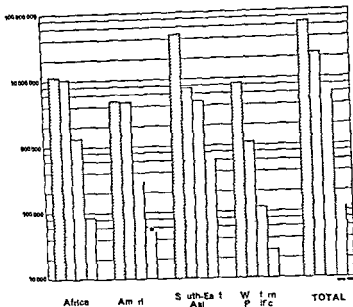
Population examined

Persons treated

Active yaws

Infected yaws

Returns incomplete



RESURVEYS BY WHO
REGIONS 1950-1958

Population examined

Persons treated

Active yaws

Infected yaws

Returns incomplete

Region of the Americas

Eradication in Progress

Argentina	Guadeloupe
Bolivia	Guatemala
Brazil	Honduras
British Guiana	Jamaica
British Honduras	Mexico
Colombia	Nicaragua
Costa Rica	Panama
Dominica	Paraguay
Dominican Republic	Peru
Ecuador	St Lucia
El Salvador	Surinam
French Guiana	Trinidad and Tobago
Grenada	Venezuela

Pre eradication Survey

Cuba

South East Asia Region

Eradication in Progress

Afghanistan	Indonesia
Burma	Portuguese India
Ceylon	Thailand
India	

Pre eradication Survey

Nepal

European Region

Eradication in Progress

Albania	Spain
Bulgaria	Turkey
France (Algeria)	Union of Soviet Socialist Republics
Greece	
Portugal	Yugoslavia
Romania	

Eastern Mediterranean Region

Eradication in Progress

Iran	Lebanon
Iraq	United Arab Republic
Israel	Syria
Jordan	

Pre eradication Survey

Libya	Tunisia
Pakistan	United Arab Republic
Saudi Arabia	Egypt

Pilot Project

Ethiopia	Sudan
Somalia	

Western Pacific Region

Eradication in Progress

Cambodia	Sarawak
Laos	Taiwan
Philippines	Republic of Viet Nam
Ryukyu Islands	

Pre-eradication Survey

Republic of Korea

Pilot Project

Netherlands New Guinea North Borneo

Following the approval by the Twelfth World Health Assembly of a plan for the expansion and intensification of WHO's work in the field of international medical research an Advisory Committee on Medical Research met in Geneva in the autumn of 1959 to provide the Director General with guidance on future research activities. While international medical research must still concentrate on the communicable diseases with particular reference to virus and tropical diseases the first objectives in the highly industrialized countries are the chronic diseases and particularly cancer and cardiovascular troubles. Because of the rapidly expanding use of fissionable materials for peaceful needs medical research must be concerned with the increased risk of human exposure to ionizing radiations as well as with the possible genetic effects of radiations. As regards the type of research to be undertaken priority will go to "service to research" such as standardization of nomenclatures techniques and equipment and the expansion of the WHO system of international reference centres for the identification of certain types of virus and of malignant tumours.

"In evaluating the progress made by WHO in this particular field one has to keep in mind the fact that the world wide medical research programme under intergovernmental auspices is a development for which there is no precedent. Useful as some of the established patterns of central research organization have proved in this respect it has also been found that many are not easily applicable to the international scene. Therefore in addition to building up the scientific programme we had to develop the necessary organizational framework and administrative patterns

PROFESSORS ASSIGNED TO MEDICAL, PUBLIC HEALTH AND OTHER SCHOOLS IN 1959

BY SUBJECT			BY COUNTRY		
	Prof	ss rs M ths		Prof	so M th
Internal public health			Afghanistan	8	73
Infectious diseases			Bath Solomon Islands	1	3
Anatomy	2	70	Burma	2	14
Biology	1	12	Cambodia	7	56
Environmental sanitation	16	141	Ceylon	5	31
Health education	1	12	China	4	37
Legal medicine	1	4	Cyprus	1	12
Medical physics	1	4	Ethiopia	4	48
Maternal health	1	4	Fiji	2	24
Nursing	73	725	India	19	174
Nutrition	1	3	Indonesia	5	53
Obstetrics, gynaecology, ecology	1	3	Iraq	8	79
Ophthalmology	1	8	Israel	1	12
Pediatrics	2	10	Lebanon	4	39
Pharmacology	1	12	Libya	1	1
Physiology	3	25	Nepal	5	54
Preventive medicine	6	26	Nigeria	3	60
Public health	1	12	Pakistan	4	30
Radiology	1	2	Philippines	3	19
Social medicine, public health	7	55	Ghana	4	5
Surgery	1	1	Sri Lanka	2	16
			Sudan	6	67
			Thailand		39
Therapeutics			United Arab Republic	15	112
Toxicology			Vietnam	4	39
Anatomy	8	78	Zambia	1	12
	129	113		129	113

smallpox eradication campaigns in Africa.² The goal of world wide eradication should be greatly advanced by the all India eradication campaigns for which recommendations were drawn up in 1959. The assistance given by the Organization to individual countries consisted mainly of guidance on choice of

vaccine techniques of preparing it and training of laboratory personnel.

In the field of poliomyelitis the outstanding development was the growing interest in live vaccines and increased experience of their use.⁴

In veterinary public health, the chief

² See WHO Chronicle 1960 14 8...

⁴ See WHO Chronicle 1960 14 137 14...

for this new undertaking. By the end of 1959 all this work had been completed and WHO seemed sufficiently prepared to launch the intensified programme of medical research which has become one of its major responsibilities."

Communicable diseases continue to be among the world's most serious public health problems and in the great majority of countries increased vigilance is necessary. The venereal diseases and treponematoses are a case in point.

Between 1950 and 1958 65 million persons out of the 100 millions or so in the endemic areas were examined for yaws in initial surveys assisted by WHO and UNICEF and 22.5 million were treated of whom over 6 million were patients with clinically active yaws. The figure (p. 215) shows the initial surveys and the resurveys for this period. It is nevertheless estimated that over a hundred million people still live in low prevalence yaws areas in tropical countries and studies will therefore have to be made of the problems of such areas if effective assistance in fighting these infections is to be given to the health administrations concerned. Towards the end of 1959 steps were taken by WHO to establish a treponematoses advisory team for such studies.

Recrudescence of venereal syphilis continues to be observed in some countries and this has justified the trial of new epidemiological methods (e.g. the cluster technique¹) for ascertaining the use of the fluorescent antibody technique (devised by the WHO Serological Reference Centre) for specific and rapid recognition of the disease and the development of new serum tests based on finger pricking.

Another problem is the growing incidence of gonorrhoea: this was observed in 15 out of 22 countries where the disease is notifiable. An Expert Committee on Venereal Infections and Treponematoses which met in 1959 suggested that WHO study this problem.

The general problems of the development of bacterial resistance to antibiotics and the hypersensitivity and anaphylactic reactions of the host to these antibiotics received much attention during the year from various expert bodies such as the Scientific Group on Anti-

biotics Research, the Advisory Committee on Medical Research and the Expert Committee on Venereal Infections and Treponematoses mentioned above. In the field of tuberculosis the first findings were reported from the study undertaken by the Tuberculosis Chemotherapy Centre of Madras, India, in collaboration with the Medical Research Council of Great Britain and the Indian Council of Medical Research on domiciliary as compared with sanatorium treatment of tuberculosis.² Leprosy control was the subject of three important meetings in 1959: a conference in Brazzaville, Republic of the Congo sponsored jointly by the Commission for Technical Co-operation in Africa South of the Sahara (CCTA) and WHO,³ and an expert committee⁴ and a scientific group on research both in Geneva.

Work against bilharziasis in 1959 concentrated on two major problems. A survey was started to determine how far the efficiency of molluscicides depends on such factors as climate, sunlight, topography and the quality of water, while a team visited ten countries in the Eastern Mediterranean and African Regions to study ways of preventing bilharziasis in newly irrigated areas with particular reference to the construction of canals and the improvement of agricultural practices.

Steps were taken during the year to implement the resolutions of the Eleventh and Twelfth World Health Assemblies on the subject of smallpox eradication. Though the final goal of world-wide eradication is still distant, progress was made towards its attainment in all regions concerned. Programmes were being successfully organized in the Americas and eradication plans for several countries in the Western Pacific and Eastern Mediterranean Regions were drawn up with the help of WHO. Representatives of countries and territories in the African and Eastern Mediterranean Regions took part in a conference held in Brazzaville in November to discuss the organization and co-ordination of

See WHO Ch. 11, 1959, 13, 397.

See WHO Ch. 11, 1960, 14, 18.

See WHO Ch. 11, 1960, 14, 21.

AVIATION HYGIENE AND SANITATION

Attempts to limit the international spread of disease have a long history. In the nineteenth century many international sanitary conventions were signed but as each had a specific objective none of them replaced its predecessor or any other previous convention.¹ Just after the Second World War there were 13 such conventions and agreements in force at the same time the result inevitably being diplomatic and procedural confusion shipping difficulties and delays.

Article 21 of WHO's Constitution provides that the World Health Assembly should have the authority to adopt regulations concerning sanitary and quarantine requirements and other procedures designed to prevent the international spread of disease² and in due course the International Sanitary Regulations were drafted to be adopted by the Fourth World Health Assembly in 1951 and generally accepted.³ Their aim is to ensure the maximum security against the international spread of diseases with the minimum interference with world traffic. Specifically they are directed against six quarantinable diseases—plague cholera yellow fever smallpox typhus and relapsing fever—and the Tenth World Health Assembly⁴ made it clear that they refer expressly to those diseases and place limits on the sanitary measures to be taken in respect of other infectious diseases.

General provisions in the International Sanitary Regulations require health administrations *inter alia* to ensure as far as practicable that airports in their territories have at their disposal sufficient organization and equipment for the application of the Regulations and are provided with supplies of pure drinking water and effective systems for the

removal and safe disposal of excrement refuse waste water condemned food and other matter dangerous to health. Certain airports (designated as sanitary airports) should also be equipped with an organized medical service and facilities to combat infection. There are no specific provisions however on such matters as how pure drinking water is to be supplied or an effective waste-disposal system organized health administrations being left to make their own arrangements.

From the point of view of airport authorities therefore the International Sanitary Regulations applied expressly to only six diseases and they contained general but not detailed provisions. In 1950 the International Air Transport Association called the attention of WHO to the need for improved airport sanitation for the protection of crews and passengers against other diseases that might impair the efficiency of the crews and endanger the safety of the aircraft. This need was acknowledged by the Fourth World Health Assembly⁴ which in a general review of public health problems of air travel enunciated certain principles that it felt to be generally applicable. The health of air crews should be protected at all airports en route. An aircraft cannot with safety take off from any airport unless every member of the flight crew is physically fit. Consequently control should not stop short at the six diseases dealt with in the International Sanitary Regulations but should include other diseases such as dysentery food poisoning, gastro-enteritis and malaria. High standards of hygiene and sanitation should be applied at all international airports and direct transit areas at least on the main trunk routes. The Assembly outlined several measures that should be taken in conjunction with the International Civil Aviation

¹ Gear, H. S. & Deutschman, Z. (1956) *Disease on air and in air travel*. World Health Organization, Geneva.

² World Health Organization (1957) *International sanitary regulations*. Geneva.

³ Off. Rec. World Health Org. 1957 79 26.

⁴ Off. R. World Health Org. 1952, 35.

emphasis is still on the control of zoonoses and problems of food hygiene. In the last month of 1959 a scientific group on brucellosis met in Geneva and established plans for field trials in man of live vaccines prepared from attenuated strains of *Brucella* in countries where the disease is endemic. A world wide survey of the incidence of rabies was undertaken so that the reporting system might be improved. The effect of measures adopted against the disease studied and preventive treatment given to persons exposed to bites from animals likely to be infected. WHO is also co-ordinating work for the improvement of vaccines for human and veterinary use and for more effective laboratory procedures for the diagnosis and study of the rabies virus. A significant new development in the field of zoonoses has been the initiation of comparative studies on animal diseases analogous to cancer and cardiovascular disease in man.

In 1959 as in previous years high priority was given to the education and training of personnel. The demand for more and better trained health workers is everywhere greater than the supply. One of the promising signs for the future writes Dr Candau in the introduction to the report is the fact that in 1959 the number of fellowships granted under the aegis of WHO reached the ten thousand mark. Those who have received these fellowships are the living sources from which the public health leaders and scientists of tomorrow are drawn. The total number of fellowships awarded by the Organization between 1 December 1958 and 30 November 1959 was 1431. Of these 56% went to physicians, 12% to nurses and midwives, 7% to sanitarians and 25% to other health personnel.

The average period of study abroad was 5.6 months. Of the fellows 22% attended courses organized or assisted by WHO, 27% were admitted to other courses in academic

institutions and 51% spent a period of practical training and observation abroad. The average age of the fellows was 37 years. Most of them came from various health services but 18% were on the staff of teaching institutions and 6% came from institutions primarily concerned with research. A further 5% of the fellows were young people studying abroad for basic professional qualifications for which no training facilities existed in their countries.

Fellows came from 112 countries and visited 89 countries. The major countries of study i.e. those receiving more than 5% of the fellows were the United Kingdom, the United States of America, France, Denmark, Sweden, India, the Netherlands and the United Arab Republic (Province of Egypt). Of the fellowships awarded 60% were for the study of public health organization and health promotion, 22% for the study of communicable diseases and 18% for basic medical sciences and education.

WHO also continued to assign professors to medical, public health and other educational institutions, one of their duties being to prepare local staff to carry on their teaching functions at the end of their assignments. In 1959 a total of 1158 months was served by 129 teachers in 19 disciplines in 27 countries (see table on page 217).

Other activities on which the Organization laid special emphasis in 1959 include the community water supply programme that was approved by the Twelfth World Health Assembly, research in insecticide resistance, the development of new pesticides and the prevention and treatment of protein malnutrition.

The report contains separate chapters on work in the different regions and a list of country, inter-country and inter-regional health projects helped by the Organization between 1 December 1958 and 30 November 1959.

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¹ Cf. H. S. A. Deutschman, Z. (1956) *Disease control and international health organizations*. World Health Organization, Geneva.
² World Health Organization (1957) *International sanitary regulations*. Geneva.

³ Off. Rec. W.H.A. Org. 1957 79 6

⁴ Off. R. W.H.A. Org. 1952, 35

Organization to assist Member States in dealing with the problem. Among them was the preparation of a guide to hygiene and sanitation in the operation of airports open to international traffic.

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to the airport health and operating authorities and used to determine whether the airport water meets the bacteriological standard and if not, what corrective measures are required. The water supply should be inspected by a competent sanitary engineer at least once a year, and also whenever changes are made in the system that might affect the quality of the water. If the airport authorities are themselves responsible for the water supply, they must provide safe water of a quality at least equal to that established by the WHO International Standards for Drinking Water.

If water must be drawn from a supply of inferior or unknown quality for use by crews or passengers, it should be given sufficient treatment to destroy the cysts of *Entamoeba histolytica* and the virus of infectious hepatitis, all the other disease organisms generally found in contaminated water will be destroyed by this treatment. Boiling is effective except at altitudes above 3000 m (about 10 000 ft). If chlorination is used, the water to be treated must be clear and free from noticeable pollution. Filtration can be used to remove suspended solid matter, and when done through porcelain filters or about 75 cm (30 inches) of filter sand, can effectively remove cysts. Chlorination to about 0.3 parts per million (p.p.m.) of residual chlorine destroys the vegetative forms of water-borne disease bacteria, but very much larger amounts, of the order of 8–10 p.p.m. of free available chlorine, are needed to kill amoebic cysts and inactivate the virus of infectious hepatitis. These large amounts may produce objectionable tastes and odours, and dechlorination is then advisable with sodium thiosulfate, sulfur dioxide, or some comparable reducing agent that is not itself toxic. All water should be chlorinated to such an extent before loading on aircraft that it contains 0.3 p.p.m. of free available chlorine 30 minutes after treatment.

It is not enough that the water supply should be safe. Care should also be taken to ensure that drinking fountains, pipes, aircraft water systems, water hose, and water carts—everything in fact in which the water is kept or through which it passes—are easy to clean and are kept clean.

⁵ *Wild Hlth Org. Rpt. S. 1959 174*
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⁷ *Int. In lat. n. Genev*
⁷ *World Hlth Organizat. on (1958) I t rna l s t nda d*
⁷ *f d l kng t G*

Food should be of good sanitary quality placed in refrigerators as necessary and kept scrupulously clean. All meat and fish should be thoroughly cooked before serving. In tropical countries infection with *Ascaris* is widespread so that raw foods such as green salads and chopped raw vegetables should be avoided. All food should be carefully handled and protected from contamination by animals, insects, soiled hands and dirty surfaces. To prevent chemical poisoning vessels and utensils containing such elements as cadmium and lead should be avoided, the strictest precautions observed regarding the use of poisons around food areas and only foods of the highest purity purchased. Because of the special hazards of foods like cream, milk and milk products, cracked eggs (especially ducks'), shellfish, gravies and meat salads and dressings, preference should be given to plain simple foods requiring the minimum of handling. Raw oysters and other shellfish should not be used unless it is certain that they are fresh, uncontaminated and come from clean areas. Milk and milk products should be sterilized and kept in bottles and the opened bottles should remain in refrigerators.

Food handlers should be placed under medical control and no person should be employed who is a carrier or in the communicable period of a disease or suffers from a gastro-intestinal infection or an acute sore throat or has on the exposed portion of the body an open wound, infection or skin disease. Spitting and the use of tobacco in any form should be prohibited in areas where food is prepared. All those who prepare or handle food should keep their hands and fingernails scrupulously clean, wear clean garments, handle food in such a way as to minimize the risk of contamination and work with surfaces, receptacles and utensils that are easy to keep clean and regularly kept clean. The buildings and premises in which they work should be so designed as to make the task of protecting the food from contamination easy. Special cleansing and germicidal treatment should be given to dishes and utensils before use. The guide gives details

of methods that can be used both in airports and on aircraft.

Wastes

The guide contains a detailed description of the handling and disposal of toilet wastes, sewage, air sickness containers and refuse at airports and on aircraft. Particular care should be taken to avoid spillage or open exposure since this leads to fly and rat infestations. If practicable the final disposal of garbage should be at a point remote from the airport; if not it can be burned, buried or ground and discharged into a sewer, open pits or dumps are unsatisfactory because of flies and rats. On aircraft the provision of watertight receptacles, easily cleanable floorings, soil-cans, tanks and wash basins is important.

Vector control at airports

Rooms used by crews and passengers in transit at international airports should be effectively mosquito-proofed in areas where mosquitos and flies are prevalent. Every day any mosquitos that may have gained entrance should be destroyed. Walls and ceilings particularly in sleeping quarters should be sprayed regularly with residual insecticide in accordance with the recommendations of the WHO Expert Committee on Insecticides.⁸ Destruction of the larvae of mosquitos should be systematically carried out in the entire area within mosquito flight range of buildings used by crews and passengers by ditching, draining, filling and elimination of water containers or by application of larvicides. To keep the area within the perimeter of the airport free from *Aedes aegypti* in its larval and adult stages, active anti-mosquito measures must be maintained over an area of at least 400 m (¼ mile) around that perimeter and all water cisterns and tanks covered or screened. For the control of flies the best method is to secure community co-operation in eliminating their breeding places and to combine this with scrupulous cleanliness at

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Wld Hlth Org t hn Rep S 1959 174
World Health Organization (1960) Guide to hygiene and sanitation in aviation Geneva
Wld Hlth Organizat (1958) International standards for drinking water Geneva

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In the years 1947 to 1953 the control of yaws was therefore not separate from the control of other diseases. The diagnosis and treatment of individual cases was the work of the joint survey teams and the areas selected for attention were not necessarily those most heavily infected but rather those where sleeping sickness was also present. In 1953 penicillin began to be used instead of bismuth and arsenic. Penicillin permitted a new approach to the problem of yaws control: it is extremely safe to use and in most cases one injection is sufficient to cure; it can therefore be used to cure both overt and latent cases and it enables a campaign to be carried out with unprecedented speed. An important consideration in the eradication of the reservoir of infection in a community. To exploit this new and effective weapon fully however special yaws control teams are needed and some were in fact created out of the joint teams in the latter part of 1953 but not in sufficient numbers to attack the disease on the wide front required in Northern Ghana.

In 1954 after visits by WHO and UNICEF representatives the Government asked these organizations to help it with yaws control and a plan was drawn up for a limited campaign in Northern Ghana—limited because the medical staffing situation was at the time precarious. The plan was put into operation in 1955. In 1956 however the staffing

situation was so much improved that the Government asked WHO and UNICEF to make the plan more comprehensive.

The present agreement between the Ghana Government and WHO and UNICEF was signed in 1957 and replaced one made two years earlier. The area chosen for the campaign covered 7 out of the 11 administrative districts of Northern Ghana containing only half of the population; the other districts were excluded because the incidence of yaws there was thought to be low. The aim was not only to treat active and latent cases and contacts in accordance with the policies recommended by WHO and set out in the fourth report of the WHO Expert Committee on Venereal Infections and Treponematoses¹ but to train staff and expand the organization so as to eradicate the disease throughout the whole country. The Ghana Government was to operate the plan, WHO giving advice and guidance, UNICEF equipment and supplies.

Northern Ghana has neighbours on every side with a similar climate and populations also suffering from yaws. A campaign against yaws would consequently risk failure if steps were not taken to attack the disease across the border particularly in areas where people from Ghana visit villages and fairs. International co-operation was therefore invoked and it was arranged that when the campaign started a similar campaign should also begin in the Ivory Coast and in Togoland.

The seven districts were covered according to a pre-arranged plan and in a systematic way. The teams moved from village to village warning the villagers in advance of their coming. Teams worked in pairs, each team consisting of an examiner and an injector. Each pair of teams was in the charge of a field assistant who dealt with publicity, returns, stores, etc. A single team might deal with 1000 persons in a day but if the villages were small and scattered the number would be very much less. A day or two behind the teams came a checker whose function it was to treat those who had for whatever reason missed being treated. The entire population was examined. All patients with clinically active disease were treated and the remainder

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The control of rats is not easy and it is advisable that the services of experts be sought in devising and maintaining a control programme. The first step towards success is good housekeeping, general cleanliness and orderly storage of all materials, food or otherwise off the ground or floor and in piles or bins. Rat proofing is essential; a section of the guide is devoted to ways and means of doing it properly. Not a simple task this for rats, apart from their gnawing powers, can jump 60 cm (24 inches) vertically, burrow equally far into the earth, climb smooth pipes up to 7.5 cm (3 inches) in diameter and travel along horizontal electric wires. As both the flea and the rat are involved in the transmission of plague, equipment and facilities are necessary for disinsecting air crews and passengers and for disinsecting, disinfecting and deratting baggage, other articles such as

bedding and portions of the aircraft. A rodent control programme that includes the rat proofing of buildings should be an integral part of the health services of every international airport.

Ground installations

To carry out this sanitary work, airports must have adequate staff, equipment and premises. The adequacy and efficiency of ground installations is of interest and concern to many groups and to increase efficiency and co-operation, committees such as national and local facilitation committees should review procedures and practices and study possible improvements. Health authorities, airport authorities, air transport officials, caterers and others interested should be represented on a review committee that will watch over the type, quality and condition of equipment, the adequacy and promptness of operations and the proficiency, intelligence and competence of personnel.

YAWS CAMPAIGN IN NORTHERN GHANA

A yaws campaign was launched in Northern Ghana in April 1966 with WHO and UNICEF assistance. Its first stage has now been completed and an interim report has been prepared by Dr David Scott, the specialist epidemiologist in charge of the Ghana Ministry of Health medical field units which carried out the work of the campaign. The article below is based on Dr Scott's report.

Northern Ghana covers an area of some 37 700 square miles of typical savannah country divided into 11 administrative districts. The population in the 1948 census was 1 045 093, the density being greatest in the east and in the extreme north west. The people are almost exclusively cultivators of the land, growing as main crops millet, maize and yams, but also rearing shorthorn cattle in some areas. There are 11 hospitals and 4 health centres.

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together with smaller yaws services created in 1944 into general medical field units. The staff of these mobile units have a long tradition of medical work in the field; they are accustomed to the hardships this kind of work brings in its train; they are experienced in establishing and maintaining good public relations and they have been trained in the recognition, registration and treatment of a number of endemic and epidemic diseases.

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AEDES AEGYPTI ERADICATION IN BRAZIL

During the present century yellow fever has been greatly reduced as a public health problem the development of effective methods of control has been made possible by the elucidation of the etiology and epidemiology of the disease. The campaigns against yellow fever in the Region of the Americas are especially interesting not only because of the nature of the problem in that Region but also because of the kinds of international collaboration instituted to deal with it.

The most effective way to control urban yellow fever is to eradicate *Aedes aegypti* the mosquito vector of the disease. Against jungle yellow fever the only effective weapon as yet is vaccination.

Size and climate made Brazil the American country most infested by *A. aegypti* and the fight against this vector has been going on there since the beginning of the century. Up to 1931 the campaign was carried on in a rather desultory fashion but with the coming into force of the Regulations of the Yellow Fever Service a basis was established for the organization of the control measures that were to culminate 24 years later in the eradication of the mosquito. These regulations made it possible to apply oil to all domestic water containers used by the mosquitos as breeding places and to fine property owners for failing to comply with the orders of the Yellow Fever Service.

In Brazil from 1933 to 1937 the first great eradication campaign that had been waged against the insect vector of any disease until then was waged against *A. aegypti*. Improved methods were adopted and applied by a country-wide service with great efficiency. Until 1940 the direction of the campaign was entrusted to the Rockefeller Foundation in that year the Brazilian Government assumed full charge and the eradication of the mosquito from its last refuges was attained by purely national efforts.

In 1940 the great importance of the resistance of the eggs of *A. aegypti* to desiccation

for months on end was recognized. Near Rio de Janeiro it was observed that the mosquito was breeding in rot holes in orange trees thousands of these holes had to be found and filled with cement. A much more important problem was the reinfestation by *A. aegypti* of localities on the banks of the big rivers particularly the Parana river system by boats coming from countries without control services against the mosquito. This showed the need for the campaign to be carried out internationally.

By 1947 *A. aegypti* infestation had been confined to the rural portions of the north eastern part of Brazil. This raised the hope that eradication of the mosquito from the whole country would soon be achieved.

The availability of DDT with its lengthy residual action greatly hastened the fulfilment of this hope. In March 1955 the country's last *A. aegypti* were found in a very isolated place in the State of Bahia. Brazil has now the great satisfaction of having completely protected a huge section of its population against all risk of yellow fever and of having by its experience contributed to the successful outcome of similar campaigns in all the other countries of the Americas and elsewhere.

Brazil is a huge country with a total area of 8 469 885 km² a very large part of which was originally infested with *Aedes aegypti*. An area of 8 270 297 km² was surveyed for the mosquito which was found in 244 366 of the 4 720 439 habitations originally inspected. Of the 1894 *municípios* (counties) into which Brazil is divided 1882 were surveyed and *A. aegypti* was found in 1187. In 961 of these eradication was achieved with oil leaving only 276 to be cleaned up with DDT. Of the 268 576 different localities surveyed 36 119 were found to harbour the mosquito. From 1931 to 1957 a total of 617 021 537 house visits were made and 3 414 210 354 water containers were inspected.

Early in 1958 in its capacity as co-ordinator of the campaign for the eradication of

of the population received half doses as latent cases and contacts

The whole population of each survey area was re examined on three separate occasions at six monthly intervals after the initial survey. If the incidence of infectious yaws was more than 2% total mass treatment was given to the whole village. If it was between 0.5% and 2% juvenile mass treatment was given i.e. adults who appeared to be free from infection were left untreated but all persons under the age of 15 years were treated. Finally if it was under 0.5% selective mass treatment was given i.e. cases received a curative dose and only their household contacts were given protective treatment.

Supervision was exercised by the medical officers in charge of the two medical units of Northern Ghana. A certain amount of day to day supervision had of necessity to be delegated to the senior subordinates.

To the east of the survey area public co-operation initially was not entirely satisfactory for unknown reasons. To the west by contrast it fell away as the campaign progressed for more obvious reasons: not everyone in a community will find it convenient to attend for examination at six monthly intervals especially when towards the end of the programme residual infection is low. In these circumstances house to house inspection had to take the place of examination at a central meeting place. In some areas of Northern Ghana (as in many other communities in Africa) there are continuous movements of population many people going south to provide seasonal labour at the end of the harvest. This has obviously a great deal of bearing on many aspects of yaws control and can never adequately be taken into account

in interpreting the records of surveys and resurveys.

Altogether the medical field unit teams in the initial survey and subsequent three resurveys did 2 056 094 examinations. At the time of the initial survey the number of cases of yaws was 50 148 (9.44%) at the time of the last resurvey 6381 (1.22%) a reduction of about 87.5%. To begin with the incidence of infectious yaws was 1.5% at the end 0.19%. A few areas continued to show a high incidence of infectious yaws at the end of the first stage of the campaign and these will receive special attention. But only two of the 48 survey areas showed a final incidence of 0.5% or more of infectious yaws the figure WHO considers to present the line below which mass surveys could be discontinued surveillance then being maintained by integrating antiyaws activities into the public health service if adequate facilities are available in the community. On the other hand the comparable figure of 2% incidence of total yaws was exceeded by two areas in the north east and by 21 out of 22 in the north west. Probably about 92% of the population was covered.

Control has now reached the second stage. Resurveys will be carried out according to the amount of yaws found in each survey area at the last resurvey. The central aim is to continue to attack the infection household by household either until it is reduced to a negligible amount or until improved living standards make transmission difficult. After another decade perhaps it may be practicable to make infectious yaws a notifiable disease in the same way as smallpox and trypanosomiasis are today. Only five years ago Dr Scott remarks this possibility would have been considered no more than a wild dream.

TABLE 1 CASES OF POLIOMYELITIS PER 100 000 POPULATION IN THE AMERICAS 1955-58

Country	1955	1956	1957	1958
Argentina	23	33.3	3.8	40
Bolivia	00	06	04	01
Brazil**	41	74	48	
Canada†	65	3.8	1.6	1.8
Chile	64	109	50	
Colombia††	14	09	14	17
Costa Rica	47	17.2	49	54
Cuba	44	09	1.5	16
Democratic Republic	—	08	00	
Ecuador	11	08	11	09
El Salvador††	04	24	29	
Guatemala	26	44	31	
Haiti	—	—	1.3	
Honduras				1.2
Mexico	61	20	50	28
Nicaragua	91	37	51	18.4
Panama	16	163	05	05
Paraguay	5.2	7.2	2.1	
Peru††	4.9	6.9	6.5	9.8
United States of America	176	91	32	35
Uruguay	21.1	27	1.8	
Venezuela††	11.7	93	7.6	57

Panama††

Estimated from data of the Ministry of Health (1955)

† Estimated from the National Institute of Health

†† Data from the Ministry of Health

— = No cases = Data not available

Country	1955	1956	1957	1958
Alaska	27.3	53	1.9	
Bahamas	—	—	1.7	
Barbados	—	—	0.4	—
Bermuda	—	—	2.4	—
Belize	0.4	0.8	18.2	—
Bolivia	13	—	—	
Canal Zone	103	42.9	—	
French Guiana	—	30.7	—	—
Guadeloupe	55	1.6	—	
Hawaii	36.8	11.8	1.8	
Jamaica	46	0.9	75.0	
Leeward Islands	—	—	—	
Alto	—	—	—	
Morocco	—	1.8	—	—
St. Kitts and Nevis	—	—	—	—
Virgin Islands	—	—	—	—
Martinique	0.8	—	—	—
Netherlands Antilles	7.7	13.0	—	
Porto Rico	19.2	2.4	1.9	
Suriname	—	—	—	—
Trinidad and Tobago	2	1.2	35.0	
Virgin Islands (USA)	4.2	—	—	—
Windward Islands	—	—	—	—
Dominica	—	—	33.0	—
Grenada	—	—	4.4	—
St. Lucia	1.1	9.0	—	—
St. Vincent	—	—	—	—

TABLE 2. CASES OF POLIOMYELITIS REPORTED IN THE AMERICAS CANADA AND UNITED STATES AND IN THE REST OF THE AMERICAS AND RATES PER 100 000 POPULATION AND PERCENTAGE 1945-1958

Year	All Countries			Canada and United States			Rest of Americas		
	Cases	Rate	%	Cases	Rate	%	Cases	Rate	%
1945	14 947	6.2	100.0	14 008	9.4	93.7	939	1.0	6.3
1946	30 467	12.3	100.0	28 225	15	92.6	2 242	2.4	7.4
1947	14 659	5.8	100.0	13 118	8.4	89.5	1 541	1.6	10.5
1948	30 840	12.0	100.0	28 894	18.1	93.7	1 946	2.0	6.3
1949	47 337	18.0	100.0	44 491	27.4	94.0	2 846	2.8	6.0
1950	7 224	13.7	100.0	34 211	20.7	91.9	3 013	2.8	8.1
1951	35 095	12.5	100.0	30 954	18.5	83.2	4 141	3.8	11.8
1952	66 374	23.6	100.0	62 634	36.8	94.4	3 740	3.4	5.6
1953	51 866	17.8	100.0	44 470	25.7	86.2	7 096	6.1	13.8
1954	47 320	16.0	100.0	40 866	23.2	85.4	6 454	5.4	13.6
1955	35 761	11.8	100.0	30 095	16.7	83.9	5 755	4.7	16.1
1956	26 068	8.5	100.0	15 747	8.6	60.4	10 321	8.3	39.6
1957	1 043	3.5	100.0	57.8	3.1	52.1	5 285	4.0	47.9
1958	11 123	3.4	100.0	6 330	3.3	56.9	4 793	3.6	43.1

P = 100 000 population

Pro = Proportional

A. aegypti from the Americas the Pan American Sanitary Bureau which acts as the WHO Regional Office for the Americas accepted the invitation of the Brazilian Government to send two consultants to Brazil to make a spot check for the presence of the mosquito. It was obviously not possible to survey all the areas previously infested and in view of the time that had elapsed since the last focus had been found and the number of routine checks made in the areas of low infestation the survey was limited to the eastern and north eastern states of Brazil where the rural infestation had been greatest and the eradication operations most difficult.

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Epidemiological and Statistical Information

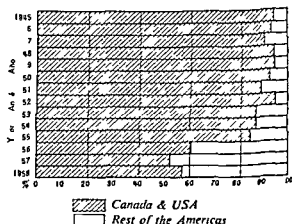
POLIOMYELITIS IN THE AMERICAS

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It is interesting to note that the total number of poliomyelitis cases reported annually in the Americas from 1955 to 1958 has decreased by more than two thirds from 35 761 to 11 123.

PERCENTAGES OF REPORTED CASES OF POLIOMYELITIS IN CANADA AND THE UNITED STATES AND THE REST OF THE AMERICAS 1945-1958



The available data show that during the years 1945-1958 poliomyelitis was a problem of considerable magnitude in Canada and the United States with more than 80% of the cases reported in the Americas up to 1955 ascribed to the two countries (see figure and Table 2). It is not possible to say to what

TABLE 1. CASES OF POLIOMYELITIS PER 100,000 POPULATION IN THE AMERICAS, 1955-1958

Country or Territory	1955	1956	1957	1958
Argentina	2.3	33.3	3.8	4.0
Bolivia	0.0	0.6	0.4	0.1
Brazil	4.1	7.4	4.6	
Canada	6.5	3.8	1.6	1.8
Chile	6.4	10.9	5.0	
Colombia	1.4	0.9	1.4	1.7
Costa Rica	4.7	1.7	4.9	5.4
Cuba	4.4	0.9	1.5	1.0
Dominican Republic	—	0.0	0.0	
Ecuador	1.1	0.8	1.1	0.9
El Salvador	0.4	2.4	—	
Guatemala	2.6	4.4	3.1	
Honduras	—	—	1.3	
Mexico	6.1	2.0	5.0	1.2
Nicaragua	0.1	3.7	5.1	18.4
Panama	7.6	16.3	0.5	0.5
Paraguay	5.2	7.2	2.1	
Peru	4.9	6.9	6	9.8
United States	17.6	9.1	3.2	3.5
Uruguay	21.1	2.7	1.8	
Venezuela	11.7	9.3	7.6	5.7

Paraguay population 1955

* Excludes District of Columbia and Puerto Rico (including Alaska and Hawaii) 1955

† Excludes the Yukon and Northwest Territories

†† Data for 1958 preliminary

— = No cases

— = Data unavailable

Country or Territory	1955	1956	1957	1958
Alaska	27.3	5.3	1.8	
Bahamas	—	—	1.7	
Barbados	—	—	0.4	
Bermuda	—	—	2.4	
British Guiana	0.4	0.8	18.2	
Catch Honduras	1.3	—	—	
Cayman Islands	10.3	42.9	—	
French Guiana	—	30.7	—	
Guadeloupe	5.5	1.6	—	
Haiti	36.8	11.8	1.8	
Jamaica	4.6	0.2	5.0	
Leeward Islands	—	—	—	
Antigua	—	—	—	
Montserrat	—	—	—	
St. Kitts, Nevis, Anguilla	—	1.8	—	
Virgin Islands	—	—	—	
Maricao	0.8	—	—	
Netherlands Antilles	7.7	13.0	—	
Puerto Rico	19.2	2.4	1.9	
Suriname	—	—	—	
Yugoslavia and Yugoslavia	2.2	1.2	35.0	
Vietnam (USA)	4.2	—	—	
Windward Islands	—	—	—	
Dominica	—	—	—	
Greenland	—	—	33.0	
St. Lucia	1.1	0.0	4.4	
St. Vincent	—	—	—	

TABLE 2. CASES OF POLIOMYELITIS REPORTED IN THE AMERICAS, CANADA AND UNITED STATES AND IN THE REST OF THE AMERICAS AND RATES PER 100,000 POPULATION AND PERCENTAGE 1945-1958

Year	All Countries			Canada & United States			Rest of the Americas		
	Cases	Rate	%	Cases	Rate	%	Cases	Rate	%
1945	14,947	6.2	100.0	14,008	6.2	93.7	939	1.0	6.3
1946	30,407	1.3	100.0	79,225	15.2	92.6	2,242	2.4	7.4
1947	14,659	9	100.0	13,118	8.4	89.5	1,541	1.6	10.5
1948	30,840	12.0	100.0	78,894	18.1	93.7	1,946	2.0	6.3
1949	4,327	16.0	100.0	44,431	7.7	94.0	2,646	2.8	6.0
1950	37,274	13.7	100.0	31,211	20.7	91.9	3,013	2.8	8.1
1951	35,095	12.8	100.0	30,954	1.5	88.2	4,141	3.6	11.8
1952	66,374	23.6	100.0	62,634	36.6	94.4	3,740	3.4	5.6
1953	51,566	17.6	100.0	44,470	76.7	86.2	7,096	6.1	13.8
1954	47,320	16.0	100.0	40,868	23.2	86.4	6,452	5.4	13.6
1955	35,711	11.8	100.0	30,036	16.7	83.9	5,755	4.7	15.1
1956	26,068	8.9	100.0	15,747	8.6	60.4	10,321	8.3	29.6
1957	11,041	3	100.0	3,758	3.1	1.1	5,285	4.0	47.9
1958*	11,123	3.4	100.0	6,330	3.1	16.9	4,793	3.6	43.1

* 100,000 population

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Epidemiological and Statistical Information

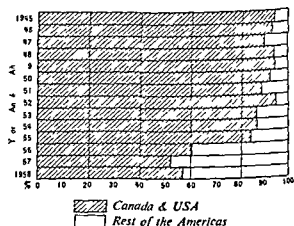
POLIOMYELITIS IN THE AMERICAS

Data on the incidence of poliomyelitis in the Americas over the past few years have recently been published by the Pan American Sanitary Bureau which acts as the WHO Regional Office for the Americas.¹

Introducing these data the PASB warns that for a given disease the cases reported to the health authorities generally represent only a fraction of the actual cases² and adds a strict comparison should be avoided between countries whose social and health conditions are dissimilar. During the four years 1955-1958 the reported incidence rates of poliomyelitis per 100 000 population varied from nil for the Dominican Republic in 1957 to as much as 33.3 for Argentina in 1956. Data for all the countries concerned are shown in Table 1.

It is interesting to note that the total number of poliomyelitis cases reported annually in the Americas from 1955 to 1958 has decreased by more than two thirds from 35 761 to 11 123.

PERCENTAGES OF REPORTED CASES OF POLIO MYELITIS IN CANADA AND THE UNITED STATES AND THE REST OF THE AMERICAS 1945-1958



The available data show that during the years 1945-1958 poliomyelitis was a problem of considerable magnitude in Canada and the United States with more than 80% of the cases reported in the Americas up to 1955 ascribed to the two countries (see figure and Table 2). It is not possible to say to what

TABLE 1. CASES OF POLIOMYELITIS PER 100,000 POPULATION IN THE AMERICAS 1955-57

Country or Territory	1955	1956	1957	1958
Argentina	2.3	3.3	3.8	4.0
Bolivia	0.0	0.6	0.4	0.1
Brazil**	4.1	7.4	4.8	—
Canada†	6.5	3.8	1.6	1.8
Chile	6.4	10.9	5.0	—
Colombia††	1.4	0.9	1.4	1.7
Costa Rica	4.7	1.7	4.9	5.4
Cuba	4.4	0.9	1.5	1.6
Dominican Republic	—	0.8	0.0	—
Ecuador	1.1	0.8	1.1	0.9
El Salvador††	0.4	2.4	2.8	—
Guatemala	2.6	4.4	3.1	—
Haiti	—	—	1.3	—
Honduras	—	—	—	1.2
Mexico	6.1	2.0	5.0	2.8
Nicaragua	9.1	3.7	5.1	18.4
Panama	1.6	16.3	0.5	0.5
Paraguay	5.2	1.2	—	—
Peru†††	4.9	6.9	—	9.8
United States of America	17.6	9.1	3.2	3.5
Uruguay	21.1	2.7	1.8	—
Venezuela††	11.7	9.3	1.6	5.7

Country or Territory	1955	1956	1957	1958
Alaska	27.3	5.3	1.9	—
Bahama Islands	—	—	1.7	—
Bahamas	—	—	0.4	—
Bermuda	—	—	2.4	—
British Guiana	0.4	0.8	18.2	—
British Honduras	1.3	—	—	—
Cape Verde	10.3	4.9	—	—
Falkland Islands	—	30.7	—	—
Guadalupe	5.5	1.6	—	—
Hawaii	36.8	11.2	1.8	—
Jamaica	4.6	0.9	75.0	—
Leeward Islands	—	—	—	—
Antigua	—	—	—	—
Montserrat	—	—	—	—
St. Kitts, Nevis, Anguilla	—	1.8	—	—
Virgin Islands	—	—	—	—
Marshall Islands	0.8	—	—	—
Northern Mariana Islands	1.1	13.0	—	—
Puerto Rico	19.2	2.4	1.9	—
Samoa	—	—	—	—
Terrace de la Guayana Francesa	2.2	1.4	35.0	—
Virgin Islands (USA)	4.2	—	—	—
Wallis and Futuna	—	—	—	—
Dominica	—	—	—	—
Grenada	—	—	33.0	—
St. Lucia	1.1	9.0	4.4	—
St. Vincent	—	—	—	—

Paralytic poliomyelitis

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Year	Americas			Canada and United States			Rest of Americas		
	Cases	Rate	%	Cases	Rate	%	Cases	Rate	%
1945	14,947	6.2	100.0	14,008	9.2	69.1	933	1.0	6.3
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1948	30,840	12.0	100.0	28,894	15.1	93.7	1,946	2.0	6.3
1949	47,337	18.0	100.0	44,431	22.4	94.0	2,906	2.8	5.0
1950	37,224	13.7	100.0	34,711	17.7	91.9	2,513	2.8	8.1
1951	35,055	12.6	100.0	30,954	15.5	88.2	4,101	3.8	11.8
1952	66,314	23.6	100.0	61,634	30.8	94.4	4,680	3.4	5.6
1953	51,566	17.8	100	44,410	25.7	86.2	7,156	6.1	13.8
1954	47,320	16.0	100.0	40,866	23.1	85.4	6,454	5.4	13.6
1955	35,761	11.8	100.0	30,005	16.7	83.9	5,756	4.7	16.1
1956	26,053	8.5	100.0	15,747	8.5	60.4	10,306	8.3	39.6
1957	11,643	3.5	100.0	5,756	3.1	27.1	5,887	4.0	47.9
1958	11,123	3.4	100.0	6,330	3.3	56.9	4,793	3.6	43.1

Per 100,000 population ** Percentage

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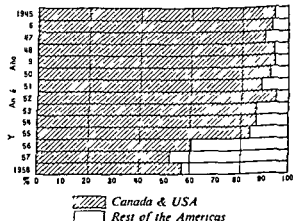
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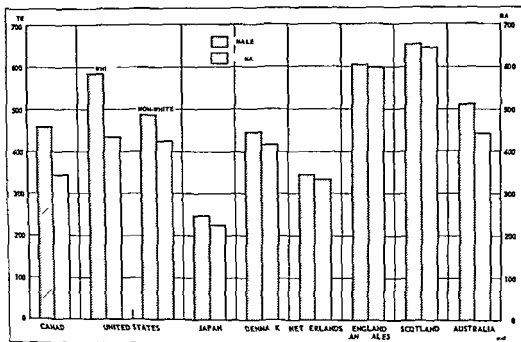
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MORTALITY FROM CARDIOVASCULAR DISEASES PER 100 000 POPULATION



The table that follows shows the median death rate for each component of cardiovascular deaths in the selected countries during the period 1954-1956

Component	Median death rate
Arteriosclerotic and degenerative heart disease	226.6
Vascular lesions affecting the central nervous system	119.9
Diseases of arteries	24.5
Hypertensive heart disease	24.1
Other diseases of the heart	19.3
Chronic rheumatic heart disease	8.9
Other hypertensive disease	8.4
Congenital malformation of the circulatory system	5.6
Diseases of veins and the diseases of the circulatory system	2.8
Cardiac syphilis	1.2
Rheumatism	0.8
Symptoms referable to the cardiovascular and lymphatic systems	—

Arteriosclerotic and degenerative heart disease accounts for the highest median mortality rate causing on an average more than half the deaths due to all cardiovascular diseases. Vascular lesions affecting the central nervous system come next in importance. These two groups cause on an average more than 78% of all deaths attributed to cardiovascular diseases.

Arteriosclerotic and degenerative heart disease is responsible for the greatest number of deaths from cardiovascular diseases in all the countries selected with the exception of Japan. It accounts for 38.5% of all cardiovascular deaths in the non-white population of the USA and 58.8% in the white population of the same country. In Japan it accounts for 18.6%. The death rate in Japan is as low as 43.9 per 100,000 population while in the other countries it ranges between 348.8 (Scotland) and 160.1 (Netherlands). The

extent the recorded numbers of cases represent reality or merely reflect greater or lesser efficiency in reporting in different countries. Nevertheless the figure shows that according to official notifications poliomyelitis is becoming with every year a more important public health problem in Central and South America. Whether this reflects the result of control measures and other epidemiological factors in Canada and the United States or a better knowledge and understanding of poliomyelitis south of the Mexico-United States border the disease seems destined to play an ever growing part in the public health programmes of the Central and South American countries and territories.

Another interesting conclusion suggested by the data collected by PASB is that the pattern of the disease from the standpoint of the age groups affected varies among different countries. While in Mexico 92.5% of reported cases occur in children under 5 years of age justifying the name of "infantile paralysis" given to the disease until recently in Canada only 26.5% of the cases occur in that age group.

On the whole however the data available for North and South America appear to confirm the tendency found elsewhere in the world for poliomyelitis to become a problem of importance in an increasing number of countries and to affect not only children but also adolescents and adults.

MORTALITY FROM CARDIOVASCULAR DISEASES

A recent WHO *Epidemiological and Vital Statistics Report*¹ was devoted mainly to mortality from cardiovascular diseases and contains statistical data from selected countries for the years 1954-1956.

In accordance with international usage the term cardiovascular diseases includes a number of diseases of the heart and blood vessels that are listed in the International Statistical Classification of Diseases, Injuries and Causes of Death. They are grouped as follows:

- (1) cardiovascular syphilis
- (2) vascular lesions affecting the central nervous system
- (3) rheumatic fever
- (4) chronic rheumatic heart disease
- (5) arteriosclerotic and degenerative heart disease
- (6) other diseases of the heart
- (7) hypertensive heart disease
- (8) hypertension without mention of the heart
- (9) diseases of arteries

(10) diseases of veins and other diseases of the circulatory system

(11) congenital malformation of the circulatory system

(12) symptoms referable to the cardiovascular and lymphatic systems

In the selected areas with the exception of Japan cardiovascular diseases cause between 55.4% (white population of the USA) and 44.6% (Netherlands) of all deaths. In Japan this proportion is as low as 29.5%.

The highest crude death rates are those of Scotland and England and Wales (648.7 and 601.7 respectively) and the lowest—with the exception of Japan (235.7)—is that of the Netherlands (338.9). These crude death rates are of course not comparable owing partly to differences in the population structure, age and sex specific death rates however show that the lowest rates are those of the Netherlands and Denmark, the highest those of Scotland and England and Wales. The Japanese age specific death rates are higher in every age group below 75 years than those of Denmark and the Netherlands and in fact have the same pattern as in other areas. Mortality from cardiovascular diseases per 100 000 population is shown in the figure

The age specific death rate progresses with age. The median rate is 1.3 per 100 000 population below 35 years of age and increases to 45.4 in the age group 75 years and over.

In all the countries selected the death rate is higher for females than for males with the exception of the USA where it is practically the same for both sexes.

Congenital malformations of the circulatory system are the cause of 0.7 to 1.7% of deaths due to cardiovascular diseases. The death rate ranges between 2.6 (Japan) and 6.5 (Canada) per 100 000 population.

The highest proportions and rates are found in the youngest age group in which congenital malformations of the circulatory system are by far the most important cardiovascular disease causing death. The death rate is higher for males than for females in all the selected countries.

Cardiovascular syphilis A generation ago syphilis ranked as a major cause of heart disease. Today syphilitic heart disease is rare because early treatment with penicillin eliminates the original infection long before the heart and blood vessels become involved. This may explain the present low death rate for cardiovascular syphilis which in the selected countries ranges between 0.7 and 2.5 per 100 000 population except in the non-white population of the USA where the rate is 5.6 per 100 000 population.

The death rate for cardiovascular syphilis does not exceed 0.2 per 100 000 population in the lower age groups but reaches its maximum in the groups 65-74 years or above ranging between 4.2 and 12.3 per 100 000 population (except in the non-white population of the USA, where it reaches the high level of 33.3). The death rate for cardiovascular syphilis is higher in males than in females.

Educating the people for malaria eradication

The task [of malaria eradication] in itself is planning and preparation on a tremendous scale. It needs tens of thousands of teams of field workers and millions of tons of supplies and equipment. Hundreds of millions of homes must be visited, hundreds of millions of blood tests carried out and tons of drugs supplied. Remote habitations must be visited, requiring all manner of mechanized or animal transport and several categories of specialists—including doctors, engineers and laboratory workers—and many helpers must be mobilized to work in co-ordination.

Much valuable time can be saved if the people have their houses ready for spraying when the spraying team arrives. It is also important that every single house be treated with the insecticide. An untreated house may well become a pocket of infection and a threat to the entire community. Therefore any person who through indifference or ignorance neglects to have his house sprayed should be persuaded upon by his enlightened neighbours to fall in line with the rest of the community.

In the second phase of the programme when the spraying is over attention is concentrated on the discovery and treatment of malaria patients. The people can render valuable assistance by promptly reporting all cases of fever to the health authorities and by observing the rules to prevent the infection from spreading.

Eradication will mean the liberation of millions from this enslaving disease which saps the energy of the people and kills untold numbers economically ruinous. For instance it is estimated that in one country of this Region—India—an annual economic loss caused by the disease is \$500 000 000. On the positive side is the example of Ceylon where the virtual disappearance of malaria has resulted in saving of about \$30 000 000 a year—which is six times the total expenditure on the 10-year antimalarial campaign.

[It is important] to start a process of education of the people leading to their active co-operation in the effort which the governments of the Region are making to wipe out malaria.

Dr C. MANS, WHO Regional Director for South-East Asia

great discrepancy between Japan and the other countries may be real or simply due to differences in medical concepts diagnostic skills disease classification and certification practices or to the local interpretation of coding rules In Japan vascular lesions affecting the central nervous system replace in importance arteriosclerotic and degenerative heart disease

The death rate increases with age in all countries Females have a lower death rate than males in every age group especially in the middle years of life

Vascular lesions affecting the central nervous system cause between 20.4% and 28.9% of all deaths due to cardiovascular diseases in the countries selected with the exception of Japan where the proportion is as high as 59.0% (though the death rate 139.0 is not the highest) This proportion indicates the relative importance of this cause of death in Japan where such lesions are predominantly haemorrhagic Although it has not been definitively proved cerebral haemorrhage is believed to occur usually in hypertensive persons at sites where arterial walls are weakened by disease Whether or not cerebral haemorrhage in Japan is usually the result of cerebral arteriosclerosis is not known but death rates for arteriosclerotic and degenerative heart disease hypertensive heart disease diseases of arteries and other diseases of the circulatory system are much lower in Japan than in the other countries selected On the other hand death rates for symptoms referable to the cardiovascular and lymphatic systems are many times higher in Japan than in the other countries It would appear to be worth while to compare methods of certification diagnostic criteria and coding practices in Japan with those of other countries as a preliminary to any inquiry into the meaning of the differences between Japanese statistics and those of the other countries

Death rates for vascular lesions affecting the central nervous system range in the countries selected between 90.6 (Canada) and 187.3 (Scotland) per 100 000 population The median rate progresses with age from 1.8 per 100 000 population in the age period

below 35 years to 2072 in the age group 75 years of age and over Age specific death rates are highest in general for the non white population of the USA and for Japan

Diseases of arteries This cause of death is responsible for between 3.6% (non white USA) and 6.6% (Netherlands) of deaths due to cardiovascular diseases in the countries selected with the exception of Japan where the proportion is 1.6%

Hypertensive heart disease It is almost impossible to arrive at an accurate estimate of the total number of deaths from hypertensive heart disease or to distinguish between hypertensive and non hypertensive cases of arteriosclerotic heart disease This is because the present coding rules provide that hypertensives dying of myocardial infarction or other forms of coronary disease should be entered under arteriosclerotic heart disease According to the published cause of death statistics in the countries selected however hypertensive heart disease accounts for between 1% of all cardiovascular deaths in Japan and 18.2% in the non white population of the USA The death rate ranges between 2.3 (Japan) and 82.7 (non white population of the USA) per 100 000 population

Rheumatic fever This cause is responsible for between 0.1% and 0.4% of deaths due to all cardiovascular diseases Death rates of the populations under discussion range between 1.4 (non white population of the USA) and 0.3 (Netherlands) with a median rate of 0.8 per 100 000 population

The median death rate below 45 years of age was 0.6 per 100 000 population and increased with age until it reached 1.2 in the age group 75 years and over It is interesting to note that the death rate is exceptionally high in Japan in the older age groups being 4.9 in the age group 65-74 years and 7.1 in the age group 75 years and over

Chronic rheumatic heart disease In the countries selected this cause of death accounts for 1.531% of deaths due to all cardiovascular diseases The death rates range between 3.6 (Japan) and 18.9 (England and Wales) per 100 000 population

The Committee discussed the planning of training for teachers in health education the desirability of one person in each training institution being responsible for the co-ordination of courses and activities in health education and future national and international developments studies and research in the subject. It felt that improvement would be achieved by the formation of joint committees representing governmental agencies in education and public health and also the teaching profession voluntary health agencies parental organizations and other interested bodies the stimulation of discussion of health problems by parent teacher and other organizations studies of existing training activities local pilot projects in schools to stimulate interest and promote action in health education pilot projects in teacher training institutions revision and improvement of the teacher's health education curriculum seminars and extension of

opportunities for training while in service the development of suitable teaching material and studies of ways of adapting health education to children's needs and interests of influencing attitudes as well as habits of developing continuity of health teaching and of assessing the effectiveness of the various educational materials and media. International governmental and non governmental agencies could assist with experimental programmes of health education in training institutions providing consultants if required finance fellowships or scholarships for study abroad hold seminars or other meetings between countries prepare annotated bibliographies on school health education prepare and maintain an inventory and abstracts of all studies and research into the training of teachers in health education and sponsor further meetings of expert groups to study the problems that may arise.

Local health service*

An indispensable preliminary to a programme for the development of local health service is some knowledge of local health and the factors influencing it. A WHO Study Group on Local Health Service which met in 1954 produced a scheme¹ for the study of local health in the form of a questionnaire covering not only health but also general social and economic conditions. To assess the value of the scheme in areas with a long standing health service and in others without such a service and to experiment with methods of local health study in different areas six pilot studies were carried out under the direction of the governments concerned in India the Netherlands Puerto Rico Sweden the Union of South Africa and the United Kingdom.

With these pilot studies before it a WHO Expert Committee on Public Health Administration met in October 1959 to discuss local health service.² A critical study of local health conditions must in its view examine a great variety of social cultural and economic factors in order to place the health situation in its correct perspective. The questionnaire prepared for the pilot studies had been based on this principle and as a result the studies gave a representative picture of each of the communities and information that should prove of great value in assessing present needs and indicating the directions in which further advances should take place as well as where administrative action should

* WHO Expert Committee on Public Health Administration (1956) *The report. Local health service*. (Ed. H. A. Ory, Jr.) Geneva, 1956. 9 p. Price 3.6, \$0.60 or \$1.2. Also published in French and Spanish. Published work documents WHO PA/247.59 (and not published as an annex to the report for review).

Members of the Committee: D. G. Arbones, Puerto Rico (Chairman); S. Andrew Davidson, United Kingdom; Dr. J. J. d. Préle Roux, Chile; Dr. S. Seshagiri R. u. I. dia (Vice-Chairman); Dr. G. Molnar, Czechoslovakia; Dr. M. Totté, Sweden; Secretary: Dr. C. A. A. Bramlage, Netherlands (Consultant); Dr. C. K. Chu, WHO (Secretary); Dr. R. C. H. Iderness (Consultant); Dr. J. M. Mackintosh, WHO; Dr. J. S. Peterson, WHO; Dr. F. A. Soliman, WHO; Dr. S. S. Groop, WHO.

Reports of Expert Groups

Teacher preparation for health education *

Health education is not always recognized as a discipline of its own and given an appropriate place in the training of teachers. Training courses as they now exist are insufficiently practical, insufficiently comprehensive, based on an incomplete understanding of health problems or of what health services and resources are available, and too often dependent on the assumption that health education can be taught through such courses as physical education and biology. Too little time is given to the subject; instruction often consists only of lectures to large classes, and practical training in the form of practice teaching, if provided at all, is often inadequately planned or executed. There is a serious shortage of teaching staff with health education training and of textbooks and educational material.

Growing interest in health education and recognition of its importance give promise of a changed outlook for the future and the need for some form of international guidance in the training of teachers was acknowledged by a Joint WHO/UNESCO Expert Committee that met in Geneva in November 1959¹ to prepare a flexible framework of guiding principles on teacher preparation for health education. The training of a teacher in health education—the Committee urged—should take place not only through courses

of instruction but also through the life he leads in his training institution and in the school community his contact with student services and his experiences in practising teaching

Health education in schools should be based on the health needs and interests of the child. The teacher has many opportunities for imparting this education because he is concerned with planning for healthy living in the school. He has a role in the school health services and is the person who will give direct health teaching to the children. He can too seek the help of physicians, dentists and others in giving instruction on health. If trained in the practical aspects of nutrition he can encourage pupils to develop good food habits and understand the relation of food to growth and health and see that classes of domestic economy are used for this purpose as well as to inculcate sensible habits in child care and feeding, home improvement and sanitation and family relationships.

To give health education successfully the teacher must have had specific and systematic instruction on growth and development personal and community health school health practice and methods of health education knowledge of these subjects he may acquire by health activities in his training institution by his relations with student health services and from direct instruction as well as by practising health teaching as he practises teaching in other subjects When he becomes a fully fledged teacher himself he will have further opportunities of gaining experience of health education not only by the process of teaching itself but also by planning curricula and from extension or correspondence courses short courses or seminars or working conferences of teachers

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Member f th Comm ttee D F W C l m t A t l

(Chairm n) M r S l D Duncan P a m a M L F a n c

Fran (V c Ch rm) D W C h a r u t e C e y l P r o f

f e o T R i c h S w i t z e r l a n d (V c Ch rm) M E S h e e

d U S A (R p p o n t) D r L V a n c u o r C e c h l a k M

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S e c i a r i a t M r V L e m a , U N E S C O M P T O a t a , U N E S C O

(J o i n t S e c r e t r y) M r S T a g u a n e U N E S C O M a r t i n

M a r t i n a n W H O (J r t S e c r e t a r y) D F M o r a n W H O

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the methodology of household health surveys that would incorporate the experience gained in the pilot studies and the recommendations of the WHO Expert Committee on Health Statistics and other WHO and United Nations expert bodies. Such a manual should contain suitable questionnaires, advice on sampling procedures, definitions of the terms used, a classification and codification scheme for the data collected and tabulation procedures.

Factors affecting local health service

The efficiency of health work in local areas is often affected adversely by over-centralization of health services and decentralization is the remedy. But for decentralization to be a success there should be an efficient local administration ready to accept the responsibility of providing health services and a local community that will participate actively in the work. Every possible means of promoting community participation should be explored among them: community health councils or advisory committees, Red Cross societies and teachers, and the health staff should be given some understanding of methods of community work. General practitioners tend usually to concentrate upon the cure of the sick rather than upon the prevention of disease. If they could be given a proper idea of public health and share responsibility with the local health authorities for the protection and promotion of the health of the community, the efficiency of the local health service would undoubtedly be much increased. More attention should therefore be paid to public health in the curricula of medical schools and there should be close collaboration between public health administrators and medical education authorities in developing field teaching facilities in community health service.

Urbanization problems are constantly being created nowadays by the rapid immigration of large populations into the towns in response to the needs of industrial development. Many of these problems could be solved by careful planning and co-ordination of all new developments and it is essential

that the health authorities be represented at a very early stage of the planning. Not only is the physical health of the people involved in these urban aggregations, their mental and social health is also involved. One means of solving some of the problems is to establish industries for women as well as for men in the area.

A balanced social and economic development in a community is an essential factor in promoting local health. The reverse is equally true: indeed in many instances the health service has been the pioneer activity in an under-developed area and has opened the way for economic development, although its further progress has depended on social and economic advance. The Committee endorsed the view of the WHO Executive Board that the human factor is fundamental to social and economic development and that the protection and promotion of health must underlie any programme to raise the standard of living.

Requirements for further development

A well organized domiciliary service should supplement the work of hospitals and out-patient departments and enable them to play a more efficient part in medical care. The time a patient spends in a hospital or an out-patient department is a mere fraction of his lifetime; he should therefore be seen on at least one occasion in his own environment. Hospital and domiciliary services should be closely integrated so that the work of one is complementary to the work of the other: hospital beds are used to the best advantage, the work load of the hospitals is reduced and patients are more effectively followed up. It is more economical to care for some types of patients (for example the aged and the chronic sick) at home. An efficient domiciliary health service could not only do this, it could also help improve home sanitation, impart health education, give practical advice on diet and personal hygiene, undertake deliveries at home where housing conditions are reasonably adequate and look after the children afterwards. This work should be

be taken to secure more precise information. In five out of the six pilot study areas a family health survey had been carried out by the sampling method and had enabled the health administrators to take a close look at families and examine in detail their health in relation to their living situation. The scope and possibilities of such a family survey—the Expert Committee held—would naturally vary from country to country and locality to locality and would also be dependent on information taken from records in hospitals, health centres and elsewhere. Its aim should be to complement the findings of the community study so as to provide as complete a picture as possible of local conditions.

The pilot studies had been an experiment to see if the method of study outlined by the Study Group was applicable to different kinds of locality and if it needed modification. Had it succeeded? The Committee emphasized that the studies were not intended to provide a comparison between one country and another or even between different parts of the same country. But they demonstrate a means of carrying out carefully planned observations on the health and related conditions of the community, establishing a base line on which periodical health assessment can be made and furnishing the information whereby further needs can be determined and health programmes planned.

The pilot studies are also very useful in showing where there are gaps to be filled and improvements to be made in the original scheme of study. In the family health survey for example, the interviewer visited the families once every two or three months in some cases over a full year, recording his observations according to two sets of questionnaire schedules—the household and the individual. Experience showed that these intervals were too long. To enable members of families to recall their illnesses more accurately it is essential for visits to be made at intervals of not more than one month. Again the amount of detail varies in different reports and for different subjects and at times is totally lacking or very sketchy. The dietary survey was found difficult to carry out in the Netherlands; it was done by a dietician. In the

same country the housing part of the study was done by a special interviewer assigned to it by the housing authorities. Accurate information on the cost of medical care and health services was difficult to secure because separate figures for each area were not available. Data on family income were not readily forthcoming not only because questions about it were regarded with suspicion but also because in rural communities part of the family income is in kind rather than in cash. Finally there is the information about illness itself. It might be expected that it would be easy to find out if and for how long a person has been ill. In actual fact chronic illness like diabetes or rheumatism tends to be overlooked unless it is accompanied by florid symptoms or is incapacitating. Rural people do not always consider minor ailments worth mentioning and not only has the length of time between interviews a bearing on the information vouchsafed about ailments suffered since the last interview but so too have their seventy and the question whether the doctor was called and whether they meant absence from work or rest in bed. Careful designing of the questionnaire and training of the interviewer would help avoid this difficulty and even if only a rough idea of illness is obtained some useful information might be gained in countries where data are lacking.

While the pilot studies give the essential background the picture is nevertheless not complete. For a full local health study wherever the domiciliary health staff is adequate a survey based on the household interview method is recommended. Data precise enough to serve practical public health needs could be provided by sampling survey procedures, the sample being selected with due regard to statistical considerations and to size and covering a not unreasonably long retrospective period. The type of survey might be longitudinal or cross-sectional (if the latter it would have to be repeated at intervals) but other sampling patterns are possible and might be useful. The Committee described how such a survey could be carried out and suggested the preparation of an instruction manual on

Leptospirosis in Latin America

Leptospirosis is very difficult to diagnose in tropical countries where jaundice is common and is a symptom of not one but several conditions. Proof of the difficulty is the mistake made by Noguchi: he postulated an etiological relationship between yellow fever and leptospirosis having found leptospirae in a proportion of the yellow fever patients he examined. This was indeed a mistake but one fruitful in its consequences for it drew attention to leptospirosis as a separate and individual disease. The serious kidney and liver symptoms of leptospirosis were long considered to be its characteristic symptoms but then it was discovered that the disease may exist in an anicteric form—which complicates the diagnosis to no small degree. In man it may resemble influenza, dengue, rheumatic fever, Q fever or even typhoid fever. It should be kept in mind as a possible diagnosis in cases where the patient's occupation or hobbies bring him into contact with animals or water or soil contaminated by animals.

Microscopic diagnosis of leptospirosis is not unequivocal: it is easy to mistake for leptospirae fibrin threads, fibrils or artefacts in the blood, urine or tissues. The microscopic agglutination test is therefore to be preferred: this test is highly sensitive and specific and its value is enhanced because antibodies persist in the blood for several years after infection. In areas where numerous serotypes may be present, it is necessary to employ multiple antigens.

Vast areas in Central and South America have a terrain, a climate, agricultural methods and an abundant fauna that may be ideally suited for the spread of leptospirosis in man and animals. However, systematic studies of its prevalence are few. What is its distribution in the various countries of Latin America and what species are found in them? In an article shortly to be published in the WHO Bulletin, A. D. Alexander attempts an answer to these questions. More

than 60 different serotypes have been described in the world but only seven have been identified in Central America and five in South America. In the past outbreaks or cases of leptospirosis were confused with yellow fever especially in Ecuador, Mexico, Brazil and Peru. Most of the leptospirosis in Latin America has been attributed to the classical strain *Leptospira icterohaemorrhagiae* which has been demonstrated in man and in rodents in Mexico, Costa Rica, Cuba, Puerto Rico, Jamaica, some of the islands of the Lesser Antilles, Brazil, Argentina, Chile, Paraguay, Uruguay, Ecuador, Venezuela, French Guiana and Surinam. A few human cases of *L. canicola* infection have been reported in Cuba, Puerto Rico, Jamaica, Argentina, Brazil and Uruguay. Outbreaks of *L. pomona* infection in man have been repeatedly shown in Argentina and a case has been reported from Chile. A strain related to *L. kramastoi* has been isolated from a human being in Jamaica. Six serotypes—*L. icterohaemorrhagiae*, *L. djajati*, *L. ballum*, *L. grypotyphosa*, *L. alexis* and *L. bovicina*—have been associated with human infections in Puerto Rico, a hyperendemic area of multiple leptospirosis. Recent serological surveys have uncovered foci of multiple leptospirosis affecting a large percentage of the human or animal population in some parts of Panama, Bolivia or Surinam, and there is evidence that other and perhaps new serotypes may be found in Latin America.

The significance of leptospirosis in domestic animals depends particularly on its relationship to human infections. In relatively few studies have there been observations on the disease in animals. Infections in dogs caused in particular by *L. canicola* and *L. icterohaemorrhagiae* have been reported from Cuba, Puerto Rico, Argentina and Brazil; there have also been cases of periodic ophthalmia in horses (the subject of etiological studies in Argentina and Brazil). An isolated instance of an outbreak of severe leptospirosis in cattle has been observed in Brazil. Infections in a large number of "normal" animals have been demonstrated in Argentina where *L. pomona* was first isolated from swine and cattle and *L. hyos* from swine. Serological studies

carried out as far as possible with the active co operation of general practitioners

Health service records should be designed for simplicity and be used by all health units and health authorities. They would provide valuable health statistics and serve as a guide to the planning of the further development of local health units. WHO is planning simple standardized forms for trial use by selected local health units in various parts of the world

Technical supervision and assistance are needed to raise the standard of local health service. Specialists in both clinical medicine and public health should be available at intermediate and national levels. Public health laboratories, health education, maternal and child health, dental health, nutrition, mental health and other specialist services should be designated to assist the local services, their function being not merely to supervise or issue instructions but also to help apply modern medical and public health knowledge for the benefit of the people. They should also carry out field investigations in collaboration with the local health administration.

The Committee recommended the establishment of community health reference centres as scientific field laboratories for public health research. The primary reference centre as it might be called, would deal with questions referred to it by health officers in the course of their daily work (the control of epidemics, for example, or epidemics

logical studies of various kinds) serve as a teaching centre and demonstration unit and carry out field research in public health. It should cover a number of communities of sufficient size to form a district where specialists could assist the local services and have enough well trained staff to carry out its routine functions and teach as well. A national reference centre should be staffed and equipped to undertake research into public health problems of greater technical complexity—problems that are beyond the scope of primary reference centres or are referred by them.

For assessing the progress of the health services year by year or measuring levels of health, health indicators would be ideal but the work of the United Nations and WHO¹ shows that they are by no means easy to devise. Further studies should be made, perhaps the method of health survey used in the pilot studies might help, though each authority would need to adapt it to suit local conditions. In any case the issue of an annual report by the local health officer would be a useful means of recording progress and if the terms used in it were in common acceptance it would doubtless help achieve better understanding of the health situation in different countries and thus further international collaboration in health work.

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"The dire effect of [helminthic diseases] upon a rural nation was clearly brought home to me by a statement recently made by an American medical observer that the worms infesting the people of a certain semi tropical country metabolize more of the produce of that country than do the inhabitants. Half the work of a sick peasantry therefore goes into the cultivation of food for the worms that make them sick."

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to be kept in mind while diagnosing gonorrhoea

After reviewing the main laboratory studies on gonococcal resistance Carpenter concludes that the amount of resistance shown by gonococcal cultures does not suffice to explain the way in which gradually resistant strains able to defy treatment are produced *in vivo*. We do not have as convincing data for the gonococcus as we have for other bacteria that are resistant to antibiotics.

Clinical evidence of gonococcal resistance is not irrefutable if judged by strict standards. The possibility of a non-gonococcal secondary infection of the urethra or vagina continuing to develop after the disappearance of the gonococcus cannot be scouted. When symptoms of urethritis persist after antibiotic treatment, the causative organisms of these conditions must be sought before gonococcal resistance to penicillin is incriminated.

Sensitivity to primaquine

Of all the 8 aminoquinolines so far synthesized primaquine is the most active against relapses of *Plasmodium vivax* infections. Primaquine has been used successfully in the Korean War and given in combination with other antimalarials to troops crossing the Pacific; it has helped prevent malaria from being reintroduced into the USA. Its drawback is that, in the usual doses it may cause haemolysis; this haemolysis is generally self limited if the daily dose of the drug is not excessive because newly formed cells entering the circulation are relatively resistant. Occasionally when the drug is given in an excessive dosage the haemolytic effect may be severe.

In a paper shortly to be published in the WHO Bulletin A. F. Alving et al. who since 1945 have been engaged in research into the 8-aminoquinolines discuss various dosage schedules for these drugs in terms of this sensitivity phenomenon. Primaquine is not the only drug that causes haemolysis; so do compounds like naphthalene acetanilide some vitamin K derivatives and para-amino-salicylic acid (PAS) the clinical effects usually being mild. The ingestion of

partly cooked broad beans or even the inhalation of the pollen of the plant, may also cause haemolysis in persons who have the same genetic pattern of blood biochemical and enzyme abnormalities as is found in primaquine sensitivity but broad bean sensitivity is not always associated with primaquine sensitivity. This haemolytic sensitivity reaction occurs in certain ethnic groups among North American negroes, some groups of Jews, Sardinians and Caucasians for example. The inborn error of metabolism involved is characterized by a deficiency of glucose-6-phosphate dehydrogenase which affects the oxidation of glucose and certain other functions and it is suggested may be the expression of a more fundamental but as yet unknown abnormality directly determined by a mutant gene. Complete expression of the genetic defect is common in affected males, affected females being usually heterozygous and experiencing less severe haemolysis.

The toxicity of primaquine is diminished if it is given once a week together with the standard suppressive dose of chloroquine or one of its equivalents. This dosage increases the effectiveness of the drug in the radical cure of vivax malaria. A weekly dose of 45 mg for 8 weeks proved to be highly effective against severe infections with the Chesson strain of *P. vivax* curing 90% of the infections but producing no clinically demonstrable haemolysis in primaquine sensitive adult males.

Various tests have been devised to find out what individuals are sensitive to primaquine and most of them distinguish clearly between normal males and males susceptible to this kind of haemolysis. But up till now it has been difficult if not impossible to make this distinction in females since most affected females have an intermediate susceptibility to haemolysis and extremely variable biochemical changes in the erythrocytes. In a paper following that of Alving et al. in the same issue of the Bulletin Brewer and his colleagues describe two modifications of a new simple test called the methaemoglobin reduction test based upon the oxidation of haemoglobin to methaemoglobin by sodium nitrite and subsequent enzymatic reconversion to haemoglobin in the presence of methylene blue.

there and in Puerto Rico Mexico Panama and Surinam have indicated a high prevalence in cattle The true incidence of leptospirosis in Latin America can only be ascertained by properly applied laboratory diagnostic methods

Gonococcal resistance to penicillin

Among venereologists and bacteriologists the disturbing news has been circulating for some years that the treatment of gonorrhoea with penicillin is only partially effective because of increasing resistance of the gonococcus to this antibiotic Much work has indeed been published to show that some recently isolated strains of gonococcus tolerate doses of penicillin that would have destroyed all members of the species some fifteen years ago Theoretically of course there is nothing surprising in this for ever since chemical substances have been used to prevent microbes from developing microbes have met the challenge by evolving a multiplicity of ways and means of adapting themselves to the new situation

To many venereologists gonococcal resistance has seemed to explain at least in part the epidemiological situation of gonorrhoea in the world In spite of penicillin treatment (says the fifth report of the WHO Expert Committee on Venereal Infections and Treponematoses¹) "the numbers of reported cases of gonorrhoea have remained virtually static or have increased—in some countries substantially In 15 out of 22 countries and territories reporting figures to WHO there has been a rise in numbers and in another four the situation appears static The annual incidence ranges from 10 to 50 per 10 000 inhabitants Far from being a disease in regression gonorrhoea is widespread and in many parts of the world is one of the most challenging of health problems Among the reasons for this are increasing difficulties in the treatment and management of the disease" while "lessened sensitivity—or resistance—to penicillin by the gonococcus may become a growing problem

An appeal for caution in the face of what may be over hasty conclusions is however made by C. M. Carpenter in a critical analysis of the chief studies published on the subject, which will appear in a forthcoming number of the WHO Bulletin² Dr Carpenter is Professor of Infectious Diseases School of Medicine University of California, Los Angeles USA

In Carpenter's view evidence of resistance is unconfirmed for those who adduce it have not always taken all the possible causes of error into account These causes are enumerated and reviewed in turn It must be certain that the infection combated is indeed due to the gonococcus and therefore the micro-organism must be isolated and identified *in vitro* The possibility of reinfection must be eliminated The penicillin level must be adequate and maintained for a sufficient length of time The action of penicillinase produced by other micro-organisms present—it has been shown to occur with *E. coli* in a case of gonococcal proctitis in the female—must also be excluded It must be certain that the drug is fully active and has suffered no deterioration The resistance of the gonococcus must be proved *in vitro*—and it must be remembered that the cultural characteristics of this bacterium make an evaluation of sensitivity tests difficult It should also be borne in mind that gonococci, living within the cell may be protected from the action of penicillin They can live in closed foci and develop afresh if the foci re-open. They can remain inactive in unfavourable conditions and multiply when conditions again become favourable In some persons the defence mechanisms against gonococci may be weakened Immunological antagonism stimulated by a previous injection may result in inactivation of penicillin

Lastly diagnostic error cannot be excluded Gonorrhoea should be clearly distinguished from other infections particularly non-specific urethritis Pleuro pneumonia like organisms have been isolated from some cases of this condition, and some authors regard these as developmental forms of the gonococcus They are possibly associated micro-organisms which multiply when the gonococcus disappears and cause similar symptoms These infections are common enough

to be kept in mind while diagnosing gonorrhoea

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there and in Puerto Rico Mexico Panama and Surinam have indicated a high prevalence in cattle The true incidence of leptospirosis in Latin America can only be ascertained by properly applied laboratory diagnostic methods

Gonococcal resistance to penicillin

Among venereologists and bacteriologists the disturbing news has been circulating for some years that the treatment of gonorrhoea with penicillin is only partially effective because of increasing resistance of the gonococcus to this antibiotic Much work has indeed been published to show that some recently isolated strains of gonococcus tolerate doses of penicillin that would have destroyed all members of the species some fifteen years ago Theoretically of course there is nothing surprising in this for ever since chemical substances have been used to prevent microbes from developing microbes have met the challenge by evolving a multiplicity of ways and means of adapting themselves to the new situation

To many venereologists gonococcal resistance has seemed to explain at least in part the epidemiological situation of gonorrhoea in the world In spite of penicillin treatment (says the fifth report of the WHO Expert Committee on Venereal Infections and Treponematoses¹) the numbers of reported cases of gonorrhoea have remained virtually static or have increased—in some countries substantially In 15 out of 22 countries and territories reporting figures to WHO there has been a rise in numbers and in another four the situation appears static The annual incidence ranges from 10 to 50 per 10 000 inhabitants Far from being a disease in regression gonorrhoea is widespread and in many parts of the world is one of the most challenging of health problems Among the reasons for this are increasing difficulties in the treatment and management of the disease while lessened sensitivity—or resistance—to penicillin by the gonococcus may become a growing problem

An appeal for caution in the face of what may be over hasty conclusions is however made by C. M. Carpenter in a critical analysis of the chief studies published on the subject, which will appear in a forthcoming number of the WHO Bulletin² Dr Carpenter is Professor of Infectious Diseases School of Medicine University of California Los Angeles USA

In Carpenter's view evidence of resistance is unconfirmed for those who adduce it have not always taken all the possible causes of error into account These causes are enumerated and reviewed in turn It must be certain that the infection combated is indeed due to the gonococcus and therefore the micro-organism must be isolated and identified *in vitro* The possibility of reinfection must be eliminated The penicillin level must be adequate and maintained for a sufficient length of time The action of penicillinase produced by other micro-organisms present—it has been shown to occur with *E. coli* in a case of gonococcal proctitis in the female—must also be excluded It must be certain that the drug is fully active and has suffered no deterioration The resistance of the gonococcus must be proved *in vitro*—and it must be remembered that the cultural characteristics of this bacterium make an evaluation of sensitivity tests difficult It should also be borne in mind that gonococci living within the cell may be protected from the action of penicillin They can live in closed foci and develop afresh if the foci re open They can remain inactive in unfavourable conditions and multiply when conditions again become favourable In some persons the defence mechanisms against gonococci may be weakened Immunological antagonism stimulated by a previous injection may result in inactivation of penicillin

Lastly diagnostic error cannot be excluded Gonorrhoea should be clearly distinguished from other infections particularly non specific urethritis Pleuro pneumonia like organisms have been isolated from some cases of this condition and some authors regard these as developmental forms of the gonococcus They are possibly associated micro organisms which multiply when the gonococcus disappears and cause similar symptoms These infections are common enough

WHO he had served as Director of Public Health in Bombay State for four years

Organizational changes at WHO Headquarters

The following changes in organizational structure at WHO Headquarters took effect on 11 April 1960

The Division of Organization of Public Health Services was split into two divisions the Division of Public Health Services and the Division of Health Protection and Promotion The distribution of units within the newly constituted divisions, both of which will, for the time being remain under the direction of Dr J S Peterson is as follows

Division of Public Health Services Office of the Director Public Health Administration Nursing Health Education of the Public Maternal and Child Health Health Laboratory Services Organization of Medical Care

Division of Health Protection and Promotion Office of the Director Social and Occupational Health Mental Health Nutrition Cancer Cardiovascular Diseases Dental Health

Pending the appointment of a fourth Assistant Director General the Divisions of Public Health Services of Health Protection and Promotion and of Education and Training will report to the Deputy Director-General

Programme Co-ordination and Programme Evaluation are henceforth attached to the Office of the Director General

People and Places

Bilharziasis foci in South East Asia

The first autochthonous infection with *Schistosoma japonicum* in South East Asia was reported in 1957 in the Mekong river valley Laos near the border of Thailand A second case was reported in a patient from the district of Chawang in Southern Thailand in 1957 and a survey in a nearby village early in 1960 revealed about 200 cases of bilharziasis japonica

The significance of these findings cannot be over-emphasized For the first time endemic foci of the most dangerous of the three human schistosomes have been found in an area formerly thought to be free of the infection Also the two foci are widely separated and in entirely different hydrographic basins It is apparent that additional foci may occur in south-east Asia and that public health and medical authorities should be on the alert The discovery of the parasite in the Mekong river basin is of particular importance since extensive plans are being made for the development of the water and soil resources of the area

Dr Y Komiyama, Chief of the Department of Parasitology National Institute of Health

Tokyo who has been appointed WHO consultant for a survey of the newly discovered foci will investigate the epidemiological aspects of transmission search for the molluscan intermediate host and attempt to infect laboratory animals with the parasite from the area His survey should be valuable to those responsible for economic development of the Mekong river basin as a basis for incorporating snail control and other preventive measures into their plans

Darrh al Diseases Advisory Team

Dr Nina F Bloumel of the USSR and Dr Richard H Dobbs, of the United Kingdom, have joined the WHO Inter Regional Diarrhoeal Diseases Advisory Team as bacteriologist and paediatric consultant respectively Their first assignment is to carry out in company with Dr Fred J Payne team leader and epidemiologist, intensive studies of diarrhoeal diseases in children in Mauritius, and possibly also in Swaziland and Basutoland

Before joining WHO Dr Bloumel carried out scientific research work at the first Moscow Medical Institute where she also received her

This test has one essential advantage—it distinguishes more accurately than any test hitherto employed between females sensitive to primaquine and normal females with erythrocytic reactions. The simple modification of the test can be used in the field in general surveys. The more accurate modification requires a photoelectric colorimeter or a spectrophotometer and is more suitable for laboratory use.

Malaria eradication in Europe

Preparations for the final eradication of malaria from the Continent of Europe within two years were discussed at a European Conference on Malaria Eradication held at Palermo, Sicily, from 31 March to 9 April 1960, under the auspices of the WHO Regional Office for Europe. The following countries were represented: Albania, Bulgaria, France (for Algeria), Greece, Italy, Morocco, the Netherlands, Portugal, Romania, Spain, Turkey, the USSR, and Yugoslavia. About fifty malariologists participated.

Fifteen years ago no less than 276 million people in the European Region of WHO (including Algeria, Morocco, Turkey, and the whole of the USSR) were exposed to malaria. Today 59 million are still exposed—30 million of them on the Continent itself. Although malaria is receding rapidly because of the vigorous campaigns launched by health services, the next phase of operations in Europe will be both difficult and critical, involving the tracing and cure of the last cases before the disease can start spreading again. Of particular importance are the measures for preventing reinfection in the border areas of countries where malaria has already been eradicated. The problem of the co-ordination of national campaigns in North Africa, where the situation is less hopeful, was also reviewed.

Smallpox eradication in Cambodia

The first national smallpox eradication campaign in tropical Asia has been launched by the health authorities of Cambodia in co-operation with WHO. By the systematic vaccination over the next five years of its 4 600 000 inhabitants it is hoped to eliminate the disease from the

country completely. The cost of the campaign is estimated at less than \$500 000. After successful mass vaccination, a comparatively small budget should suffice to maintain a state of immunity in the population. The eradication programme is being carried out within the framework of the world-wide smallpox eradication programme initiated by WHO, which is eventually expected to render the whole world safe from this disease.

The campaign has already started in the country's northern provinces, where 50 000 people have been vaccinated to date by WHO/UNICEF assisted teams that are also engaged in the mass treatment of yaws. Vaccination or re-vaccination of 80% of the population within 4-5 years (generally accepted as essential for eradication) is particularly difficult to achieve in Cambodia, where an unknown number of "water nomads" roam the River Mekong and its tributaries, crossing freely into neighbouring countries. A further problem—that of climate—has however already been overcome by the development at the Pasteur Institute in Phnom Penh of a freeze-dried vaccine that does not lose its potency in tropical conditions.

Dr D K Viswanathan

The death occurred in Madras on 27 March of Dr D K Viswanathan, senior WHO regional adviser for malaria in South East Asia. Dr Viswanathan was the principal architect of WHO's antimalaria work in this region, where seven governments have launched extensive anti-malaria programmes. He was one of the world's leading malariologists and was among the first to see the potentialities of DDT in malaria control. It was during his term of office as Additional Director of Public Health (Malaria) in Bombay State (1943-1952) that India's first trials of DDT as a residual insecticide were carried out.

Dr Viswanathan was a graduate of Madras Medical College, an M.P.H. of Johns Hopkins University, Baltimore, Md., USA, and a fellow of the Indian Academy of Science in Bangalore. He began his career in public health in 1928 and served successively in the States of Madras, Assam, and Bombay. In 1956, when he joined

Review of WHO Publications

Annual Epidemiological and Vital Statistics 1956
Geneva, 1959 705 pages Bilingual publication
(English and French) Price £3 \$12.00
or Sw fr 36—

The ninth annual statistical report to be published by the World Health Organization sets out the demographic and health conditions of the countries of the world in 1956

A study of the figures given in this report will acquaint the reader with the progress made in health throughout the world and will show him how great a task has still to be performed in vast areas despite recent advances in medical science and social organization While in the more highly developed countries mortality and the frequency of infectious diseases continue to decrease in other countries the increasingly complete statistical information becoming available reveals serious health problems which must still be faced

This new annual report contains a number of innovations In the first part for instance statistics of causes of death have been expanded In the tables on causes of death figures have been given for deaths among young children by sex and by each year of age up to four years A new table on the causes of infant mortality by age has been included Among the other important subjects which have been either treated at greater length or newly introduced in this volume are cardiovascular diseases malignant neoplasms maternal mortality and accidents according to the nature of injury

In the second part of the volume seasonal statistics of notifiable communicable diseases are given with the distribution by sex and by age for certain of these diseases

The third part which relates to statistics of health personnel hospital establishments and vaccinations has also been rearranged and extended A distinction is made between physicians proper and other practitioners entitled to provide treatment under particular and prescribed conditions in certain territories of Africa Asia and Oceania The data also distinguish between private practitioners and physicians in the public health service The number of inhabitants of each country or territory per physician is also

given the figures show vividly the still urgent need for medical personnel in certain areas of the world Statistics of nursing and midwifery personnel have also been expanded

Statistics on vaccinations cover six major communicable diseases An attempt has been made for the first time to give details of the population groups vaccinated and of the units to which the figures refer (i.e. primary vaccination or revaccination)

Bibliography on Bilharziasis 1949-1958 Geneva 1960 158 pages Bilingual publication (English and French) Price 10/ \$2.00 or Sw fr 6—

This bibliography of the world literature on bilharziasis covers material published between 1949 and 1958 and thus brings up to date two earlier bibliographies on the same subject In compiling it the important medical reference sources have been systematically searched to make it as comprehensive as possible a list of the principal sources consulted apart from the indexes and catalogues of the WHO Library is included In a few cases it was not possible to obtain the original material and the reference cited has therefore not been verified The 2877 references are arranged alphabetically by author A combined subject and geographical index in English and French appears at the end of the bibliography referring to the item numbers

Guide to Hygiene and Sanitation in Aviation
Geneva 1960 51 pages Price 3/6 \$0.60 or Sw fr 2.— Also published in French and Spanish

This booklet is a reprint of the annex to the first report of the WHO Expert Committee on Hygiene and Sanitation in Aviation (*World Health Organization Technical Report Series* 1959 174) It is reviewed at length in an article on page 219 of this number of the Chronicle

Khalil, M (1931) *The bibliography of schistosomiasis (bilharziasis) and all kinds of protozoa* Cairo Egypt Univers y Boulton, A. (1950) *Bibliographie de schistosomiasis (bilharziasis) humaine animale de 1931 à 1948* Bruxelles, Institut Royal Colonial Belge

post graduate training in epidemiology Dr Dobbs received his medical training at Cambridge and London and has been Consulting Paediatrician to the London Hospital since 1936 and to the Queen Elizabeth Hospital for Children since 1938 between 1950 and 1952 he was a member of a working party of the Medical Research Council of Great Britain which made controlled trials of various antibiotics in the treatment of infantile diarrhoea and vomiting

Training of sanitary engineers

Mr Luis F Mantilla Chief Sanitary Engineer of the Ministry of Public Health Peru has been appointed WHO Visiting Professor of Sanitary Engineering at the American University of Beirut He will help the university to develop its teaching programme in this field

As a Fellow of the Rockefeller Foundation Mr Mantilla studied sanitary engineering at Harvard University and subsequently helped to plan and initiate sanitary engineering activities in Peru Since 1946 he has been responsible for the co ordination and supervision of the academic work of the Faculty of Sanitary Engineering at the National College of Engineering Peru of which he is Dean

Virus diagnostic laboratories

Dr F O MacCallum of the United Kingdom is at present visiting Japan as WHO consultant to advise the public health authorities on the organization of virus diagnostic laboratories and on the establishment of a co ordinated network of such laboratories throughout the country with the National Institute of Health of Tokyo as the centre He will also advise on the organization of virus diagnostic training courses for technicians and doctors

In addition Dr MacCallum will visit Hong Kong to advise the health authorities on the establishment of a virus diagnostic service

Dr MacCallum is Director of the Virus Reference Laboratory Central Public Health Laboratory London England

Rehabilitation of physically handicapped children

Dr P Houssa has been appointed by WHO to advise the Government of Lebanon on the further development of a rehabilitation programme for handicapped children which was started in 1959 at the Institution Sociale d'Ouzai Beirut with help from the Organization

Dr Houssa is Director of the Centre of Traumatology and Rehabilitation Brussels and is also a member of the WHO Expert Advisory Panel on Rehabilitation

Public health laboratory service in Ghana

Dr C C Croft Assistant Chief of Laboratories Department of Health Columbus Ohio USA is spending three months in Ghana as WHO consultant in connexion with the development of a public health laboratory service Dr Croft studied bacteriology at the University of Maryland and obtained his D Sc at Johns Hopkins University Baltimore Md

Headquarters appointment

Dr Petr Senov of the USSR has been appointed Director of the Division of Biology and Pharmacology at WHO Headquarters replacing Dr Constantin Vinokourov Dr Senov is a graduate of Moscow State University and a Doctor of Pharmaceutical Sciences He has held the Chair of Pharmaceutical Chemistry in the Faculty of Pharmacy of the First Moscow Medical Institute and for many years headed the State Committee for the Pharmacopoeia of the USSR He is a Member of the WHO Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations and has served on the WHO Expert Committee on Specifications for Pharmaceutical Preparations

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International Non-Proprietary Names for Pharmaceutical Preparations

In accordance with paragraph 3 of the Procedure for the Selection of Recommended International Non-Proprietary Names for Pharmaceutical Preparations¹ notice is hereby given that the following names are under consideration by the World Health Organization as proposed international non-proprietary names

Comments on or formal objections to the proposed names may be forwarded by any

person to the Secretary Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations World Health Organization within four months from 1 June 1960

The inclusion of a name in the lists of proposed international non-proprietary names does not imply any recommendation for the use of the substance in medicine or pharmacy

PROPOSED INTERNATIONAL NON-PROPRIETARY NAMES (*Prop INN*) LIST 10²

P p o d i t r i l
N P p i t y N m
(Lat Engl sh)

Ch m l Nam D ipit

acidum thyropropicum	3 [4 (4-hydroxy 3 iodophenoxy)- 3 5-diodophenyl]propionic acid
thyropropic acid	
allylestrenolum	17α allylestr-4-en 17-ol
allylestrenol	
aminoglutethimidum	2 (p-aminophenyl) 2-ethylglutarimide
aminoglutethimide	
amphenidonum	1 (m aminophenyl) 2[1H] pyridone
amphenidone	
amphotericinum B	a polyene antibiotic substance obtained from cultures of <i>Streptomyces</i>
amphotericin B	<i>nodosus</i> or the same substance produced by any other means
androstanazolom	17β hydroxy 17α methylandrostando-[3 2 c] pyrazole
androstanazole	
anisindionum	2 p-methoxyphenylindane 1 3 dione
anisindione	
benzthiazidum	3 benzylthiomethyl-6-chloro 7 sulfamoybenzo-1 2,4(4H)-thiadiazine
benzthiazide	1 1 dioxide
biperidenum	1 (bicyclo[2 2 1] hept 5-en 2 yl)-1 phenyl 3 piperidinopropanol
biperiden	
bretylum tosylas	N-o bromobenzyl N-ethyl N N dimethylammonium tosylate (tosylic
bretylum tosylate	acid is p-toluenesulfonic acid)
bunamiodylum	3-(3 butyramido-2 4 6-triodophenyl)-2-ethylacrylate
bunamiodyl	

See A n x l p g 249

Other lists of proposed international non-proprietary names are found in *Ch on Wild Hlth Org* 1953 7 297 1954 8 216, 313 1956 10 28 1957 11 231 1958 12 102 *WHO Ch l l* 1959 13 105 152 1960 14 168

butylazamide	N-(5-butyl-1,3,4-thiadiazol-2-yl)-p-chlorobenzenesulfonamide
butylazamide	
calcium benzanodosylate	calcium 4-benzamido-2-hydroxybenzoate
calcium benzanodosylate	
calcium bismidate	calcium cyanamide
calcium carbimide	
carbamoylpropane	2-carbamoyloxymethyl 2-isopropylcarbamoyloxymethylpentane
carbamoylpropane	
chlorophenoxamine	2-(1-p-chlorophenyl-1-phenylethoxy)ethyl dimethylamine
chlorophenoxamine	
chlorprothixene	trans-2-chloro-9-(3-dimethylaminopropyl)-10-thioxanthene
chlorprothixene	
chlorphenazine	2-(2-chloroethyl)-2,3-dihydro-4-oxobenz[1,3-d]azepine
chlorphenazine	
chymotrypsin	an enzyme α -chymotrypsin obtained in crystalline form from mammalian pancreas by aqueous acid extraction of its proenzyme chymotrypsinogen, and subsequently conversion with trypsin to chymotrypsin
chymotrypsin	
cinnamidine	2-diethylaminoethyl 2-phenylsuccinate
cinnamidine	
colistin	an antibiotic substance obtained from cultures of <i>A. obacillus</i> from the same substance produced by any other means
colistin	
cyclophosphamide	N,N-bis(2-chloroethyl)-N-(3-hydroxypropyl)phosphorodiamide acid cyclic ester
cyclophosphamide	
cyproheptadine	4-(5-dibenzo[a-e]cycloheptatrienylidene)-1-methylpiperidine
cyproheptadine	
demecarium bromide	N,N-decamethylenebis[trimethyl(3-N-methylcarbamoyloxyphe-nyl)ammonium bromide]
demecarium bromide	
demethylchlortetracycline	7-chloro-4-dimethylamino-1,4,4a,5,5a,6,11,12a-octahydro-3,6,10,12,12a-pentahydroxy-11,11-dioxo-2-naphthacene-carboxamide
demethylchlortetracycline	
dibromophenylamine	(+)-(3-p-bromophenyl-3-pyridylpropyl)dimethylamine
dibromophenylamine	
dechlorpheniramine	(+)-(3-p-chlorophenyl-3-pyridylpropyl)dimethylamine
dechlorpheniramine	
diampromide	N-[2-[(methylphenethylamino)propyl]propionanilide]
diampromide	
dichlorisone	9a,11 β -dichloro-17 α -hydroxypregn-14-diene-3,20-dione
dichlorisone	
diethanol	product containing 85 per cent of 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,6,6,7,8,8a-octahydro-exo-1,4-endo-5,8-dimethannaphthalene
diethanol	
dimethoxyaniline	9-(3-dimethylaminopropylidene)-2-methoxyanthene
dimethoxyaniline	
dimethoxyaniline	1-(2-methoxyphenyl)-4-(3-methoxypropyl)piperazine
dimethoxyaniline	
diphenoxylate	1-(3-cyano-3-diphenylpropyl)-4-phenylpiperidine-4-carboxylic acid ethyl ester
diphenoxylate	

dipiproverinum	2 piperidinoethyl α phenyl- α piperidinoacetate
dipiproverine	
ditophalum	diethyl dithioisophthalate
ditophal	
emylcamatum	1-ethyl 1 methylpropyl carbamate
emylcamate	
ethenzamidum	<i>o</i> -ethoxybenzamide
ethenzamide	
ethionamidum	2-ethylpyridine-4-carbothionamide
ethionamide	
ferrocholinarum	a chelate prepared by reacting equimolar quantities of freshly precipitated ferric hydroxide with choline dihydrogen citrate
ferrocholine	
fibrinolysin (humanum)	an enzyme obtained from human plasma by conversion of profibrinolysin with streptokinase to fibrinolysin
fibrinolysin (human)	
flumethiazidum	6-trifluoromethyl 7 sulfamoylbenzo-1 2 4(4 <i>H</i>)-thiadiazine 1 1-dioxide
flumethiazide	
fluphenazinum	10-{3 [4-(2 hydroxyethyl)piperazin 1 yl]propyl} 2 trifluoromethyl phenothiazine
fluphenazine	
glucagonum	polypeptide consisting of 29 amino acid residues which would possess a minimum molecular weight of 3482
glucagon	
griseofulvinum	7-chloro-4 6-dimethoxycoumaran 3-one-2 spiro-1 -(2 methoxy-6 methylcyclohex 2 -en-4 -one)
griseofulvin	
halopeni chloridum	4 bromobenzyl 3 (4-chloro-5 methyl 2 isopropyl phenoxy)propylidimethylammonium chloride
halopenium chloride	
haloperidolum	4-(<i>p</i> -chlorophenyl) 1 [3 (<i>p</i> -fluorobenzoyl)propyl]piperidin-4-ol
haloperidol	
hexapropymatum	1 prop-2 ynylcyclohex 1 yl carbamate
hexapropymate	
hexcarbachioli bromidum	<i>N N</i> hexamethylenebis[(2-carbamoyloxyethyl)trimethylammonium bromide]
hexcarbachioline bromide	
homochlorcyclizinum	1 (<i>p</i> -chlorodiphenylmethyl)-4-methyl 1 4-diazacycloheptane
homochlorcyclizine	
hydrargaphenum	phenylmercuric methylenebis (2 naphthyl 3 sulfonate)
hydrargaphen	
hydrochlorothiazidum	6-chloro-3 4-dihydro 7 sulfamoylbenzo-1 2 4-thiadiazine dioxide 1 1
hydrochlorothiazide	
hydroflumethiazidum	3 4-dihydro-6-trifluoromethyl 7 sulfamoylbenzo 1 2 4 thiadiazine 1 1 dioxide
hydroflumethiazide	
hydroxindasatum	5 acetox 3-(2 aminoethyl) 1 (<i>p</i> methoxybenzyl) 2 methylindole
hydroxindasate	
hydroxystenozolum	17 β hydroxy 17 α methylandroster-4 eno [3 2 <i>c</i>]pyrazole
hydroxystenozole	
kanamycinum	an antibiotic substance obtained from cultures of <i>Streptomyces kanamyceticus</i> or the same substance produced by any other means
kanamycin	
levisoprenalinum	1 (3 4-dihydroxyphenyl) 2 isopropylaminoethanol
levisoprenaline	

mehhydrolum mehhydrolin	5-benzyl 1,2,3,4-tetrahydro-2-methylpyrid[4,3-b]indole
medro yprogesteroni acetat medroxyprogesterone acetate	17 α -cetoxy-6 α -methylpregn-4-ene-3,20-dione
mepenzolate bromidum mepenzolate bromide	1-methyl 3-p-tercyl benzilate methylbromide
mepheno alonum mephenoalone	5-(o-methoxyphenoxymethyl)-2-oxazolidinone
mestanolonum mestanolone	17 β -hydroxy 17-methyl 5 α -androstan-3-one
metahexamidum metahexamide	N-(m-amino-p-methylbenzenesulfonyl)-N'-cyclohexylurea
methaqulo um methaqualone	2-methyl 3-o-tolyl-4-quinazolinone
m thazolamidum methazolamide	5-acetyl amino-4-methyl 1,3,4-thiadiazoline 2-sulfonamide
methd lazium methd lazine	10-(1-methyl 3-pyrrolidylmethyl)phenothiazine
methotrexatum methotrexate	4-amino-10-methylpyrolylglutamic acid
methylchromo um methylchromone	3-methylchromone
natru carbazochromi sulfonas carbazochrome sodium sulfonate	sodium 2,3,5,6-tetrahydro-1-methyl-6-o-o-5-semicarbazoylindole 3-sulfonate
natru hexacyclonas sodium hexacyclonate	sodium 1-hydroxymethylcyclohexylacetate
nalamidum nalamide	N-succinoyl N'-(β -N-benzylcarboxamidoethyl)hydrazine
nicothazo um nicotinazone	nicotinaldehyde thiosemicarbazone
nifurethazonum nifurethazone	5-nitro-2-furaldehyde 2-(2-dimethylaminoethyl) semicarbazone
nihydrazo um nhydrazine	5-nitro-2-furaldehyde 2-ethylhydrazine
norvinisteronum norvinsteron	17 β -hydroxy 17 α -vinylestr-4-en-3-one
octalopni methylbromidum octalopni methylbromide	N-methyl-0-(2-propylpentanoyl) tropium bromide
oxyphenacylaminum oxyphenacylamine	(1,4,5,6-tetrahydro-1-methyl 2-pyrimidinyl)methyl α -cyclohexyl- α -phenylglycolate
palmidolum palmidol	N-(2-hydroxyethyl)palmitamide
paronomycinum paronomycin	an antibiotic substance obtained from cultures of certain <i>Streptomyces</i> species one of which is <i>Streptomyces imosus</i> or the same substance produced by any other means
penicillinasum penicillinase	an enzyme obtained by fermentation from cultures of <i>Bacillus</i>

pentapiperidum	1 methylpiperid-4-yl 3 methyl 2 phenylvalerate
pentapiperide	
phanquinonum	4 7 phenanthroline 5 6-quinone
phanquinone	
phenampromidum	N {2 (1 methylpiperid 2 yl)ethyl}propionanilide
phenampromide	
phenelzinum	β phenethylhydrazine
phenelzine	
phenforminum	N ¹ phenethylbiguanide
phenformin	
phenglutarimidum	α 2 diethylaminoethyl α phenylglutarimide
phenglutarimide	
phenprobamatum	3 phenylpropyl carbamate
phenprobamate	
phetharbitalum	5 5-diethyl 1 phenylbarbituric acid
phetharbital	
phytonadioli natrii diphosphas	2 methyl 3 phtyl 1 4 naphthalene di(sodium hydrogen phosphate)
phytonadiol sodium diphosphate	
pipamazinum	10-[3 (4-carbamoylpiperidino)propyl] 2-chlorophenothiazine
pipamazine	
pipethanatum	2 piperidinoethyl benzilate
pipethanate	
polycarbophilum	a synthetic loosely crosslinked hydrophilic resin of the polycarboxylic type
polycarbophil	
pralidoximi methiodidum	2 pyridine aldoxime methiodide
pralidoxime methiodide	
procainum	β diethylaminoethyl 4-aminobenzoate
procaine	
promethazini theoclas	10-(2 dimethylaminopropyl)phenothiazine salt of 8-chlorotheophylline
promethazine theoclate	
propyli docetrizoas	propyl 3 diacetylamino-2 4 6-triiodobenzoate
propyl docetrizoate	
prothixenum	9 (3 dimethylaminopropylidene)thiaxanthen
prothixene	
protokylolum	1-(3 4 dihydroxyphenyl) 2 (α methyl 3 4-methylenedioxyphenethyl amino)ethanol
protokylol	
proxiphyllinum	7 2 hydroxypropylthecophylline
proxiphylline	
stynamatum	2 hydroxyphenethyl carbamate
stynamate	
sulfachlorpyridazinum	6-chloro-3 sulfanilamido pyridazine
sulfachlorpyridazine	
sulfadumethoxinum	2 4 dimethoxy 6-sulfanilamido pyrimidine
sulfadimethoxine	
sulfaphenazolum	1 phenyl 5 sulfanilamido pyrazole
sulfaphenazol	

sulfasomizolum sulfasomizol	3-methyl 5 sulfan lamido isothiazole
sulfatolamidum sulfatolamid	1 sulfamylthiourea salt of <i>p</i> -sulfamoylbenzylamine
syrosingopium syrosogopine	4-ethoxycarbonyl 3,5-dimethoxybenzoic acid ester of methyl reserpate
thiamphenicolum thiamphenicol	D(+)-threo-2-dichloroacetamido-1-(<i>p</i> -methylsulfonylphenyl)propane 1,3-diol
thihexinolum methylbromidum thihexinolum methylbromide	trans- α,α -(dithien-2-yl)-(4-dimethylaminocyclohexyl) carbinol methyl bromide
thioproporazinum thioproporazine	<i>N,N</i> -dimethyl 10-[3-(4-methylpiperazin-1-yl)propyl] 2 phenothiazine sulfonamide
thiotepa thiotepa	<i>N,N,N</i> triethylenethiophosphoramidate
toloxylchlorinolum toloxylchlorinol	1,1-[(3- <i>o</i> -tolylloxypropylene)dioxy]bis(2,2,2-trichloroethanol)
triazolatum triazole	1-methyl 3-pyrrolidinylmethyl benzilate
trichlobisum chloridum trichlobisum chloridum	hexamethylenebis(dimethyl, 1-methyl 3-(2,2,6-trimethylcyclohexyl) propyl)ammonium chloride hemihydrate
trifluoperazinum trifluoperazine	2-trifluomethyl 10-[3-(1-methyl-4-piperazinyl)propyl]phenothiazine
trifluopromazinum trifluopromazine	2-trifluoromethyl 10-(3-dimethylaminopropyl) phenothiazine
trimethobenzamidum trimethobenzamide	<i>N</i> -(<i>p</i> -2-dimethylaminoethoxybenzyl)-3,4,5-trimethoxybenzamide
trinitratum trinitrate	triethanolamine trinitrate

Annex 1

PROCEDURE FOR THE SELECTION OF RECOMMENDED INTERNATIONAL NON-PROPRIETARY NAMES FOR PHARMACEUTICAL PREPARATIONS

The following procedure shall be followed by the World Health Organization in the selection of recommended international non-proprietary names for pharmaceutical preparations in accordance with the World Health Assembly resolution WHA3.11

1. Proposals for recommended international non-proprietary names shall be submitted to the World Health Organization on the form provided therefor

2. Such proposals shall be submitted by the Director General of the World Health Organization to the members of the Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations designated for this purpose for consideration in accordance with the General principles for guidance in devising International Non-proprietary Names appended to this procedure. The name used by the person discovering or first developing and marketing a pharmaceutical preparation shall be accepted, unless there are compelling reasons to the contrary

Text adopted by the Executive Board resolution EB15.R7 (Off. R. Wld Hlth Org. 1955 60:3)
See Annex 2, page 251

pentapiperidum	1 methylpiperi
pentapiperide	
phanquinonum	4 7 phenanthr
phanquinone	
phenampromidum	N 2 (1 methylp
phenampromide	
phenelzinum	β phenethylhyd
phenelzine	
phenforminum	N ¹ phenethylbr
phenformin	
phenglutarimidum	α 2 diethylamino
phenglutarimide	
phenprobamatum	3 phenylpropyl c
phenprobamate	
phetharbitalum	5 5 diethyl 1 phen
phetharbital	
phytonadiol natrii diphosphas	2 methyl 3 phytyl
phytonadiol sodium diphosphate	
pipamazinum	10-[3 (4-carbamoyl
pipamazine	
pipethanatum	2 piperidinoethyl b
pipethanate	
polycarbophilum	a synthetic loosely c
polycarbophil	type
pralidoximi methiodidum	2 pyridine aldoxime
pralidoxime methiodide	
procainum	β diethylaminoethyl 4
procaine	
promethazini theoclas	10-(2 dimethylaminoprop
promethazine theoclate	
propyl docetrizoas	propyl 3 diacetylamino
propyl docetrizoate	
prothixenum	9 (3 dimethylaminopropyl
prothixene	
protokylolum	1 (3 4-dihydroxyphenyl) 2 (
protokylol	amino)ethanol
proxiphyllinum	7 2 hydroxypropyltheophyl
proxiphylline	
styramatum	2 hydroxyphenethyl carbam
styramate	
sulfachlorpyridazinum	6-chloro 3 sulfanilamido pyr
sulfachlorpyridazine	
sulfadimethoxinum	2 4 dimethoxy 6-sulfanilamido
sulfadimethoxine	
sulfaphenazolum	1 phenyl 5 sulfanilamido pyra
sulfaphenazol	

sulfasomizolum	3-methyl-5-sulfanilamido-isothiazole
sulfasomizol	
sulfatolamudum	1-sulfanilylthiourea salt of <i>p</i> -sulfamoylbenzylamine
sulfatolamide	
svrosingopinum	4-ethoxycarbonyl-3,5-dimethoxybenzoic acid ester of methyl reserpate
syrosingopine	
thiampenicolum	D-(+)-thio-2-d-chloracetamido-1-(<i>p</i> -methylsulfonylphenyl)propan
thiampenicol	1,3-diol
thihexinol methylbromidum	trans- α -(2-thien-2-yl)-(4-dimethylamino-cyclohexyl)-carbinol methyl bromide
thihexinol methylbromid	
thiopropiazinum	<i>N,N</i> -dimethyl-10-[3-(4-methylpiperazin-1-yl)propyl]-phenothiazine-sulfonamide
thiopropiazine	
thiopropia	<i>N,N,N</i> -trimethylmethoxyphosphoramidate
thiopropa	
toloxylinolum	1,1-[(3- <i>o</i> -toloxypropyl)enedio]bis(2,2,2-trichloroethanol)
toloxylinol	
triazolatum	1-methyl-3-pyrrolidinylmethyl benzilate
triazate	
trichloron chloridum	hexamethylene [dimethyl(1-methyl-3-(2,2,6-trimethylcyclohexyl)propyl)ammonium chloride] hemihydrate
trichloronum chloride	
trifluoperazinum	2-trifluoromethyl-10-[3-(1-methyl-4-piperazinyl)propyl]phenothiazine
trifluoperazine	
trifluoprazinum	2-trifluoromethyl-10-(3-dimethylaminopropyl)phenothiazine
trifluoprazine	
trimethobenzamidum	<i>N</i> -(<i>p</i> -2-dimethylaminoethoxybenzyl)-3,4,5-trimethoxybenzamide
trimethobenzamide	
trinitratum	triethanolamine trinitrate
trinitrat	

Annex 1

PROCEDURE FOR THE SELECTION OF RECOMMENDED INTERNATIONAL NON-PROPRIETARY NAMES FOR PHARMACEUTICAL PREPARATIONS

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1. Proposals for recommended international non-proprietary names shall be submitted to the World Health Organization in the form provided therefore.
2. Such proposals shall be submitted by the Director-General of the World Health Organization to the members of the Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations designated for this purpose for consideration in accordance with the General principles for guidance in designating International Non-Proprietary Names appended to this procedure. The name used by the person discovering or first developing and marketing a pharmaceutical preparation shall be accepted, unless there are compelling reasons to the contrary.

3 Subsequent to the examination provided for in article 2 the Director General of the World Health Organization shall give notice that a proposed international non proprietary name is being considered

A Such notice shall be given by publication in *WHO Chronicle* and by letter to Member States and to national pharmacopoeia commissions or other bodies designated by Member States

(i) Notice may also be sent to specific persons known to be concerned with a name under consideration.

B Such notice shall

(i) set forth the name under consideration

(ii) identify the person who submitted a proposal for naming the substance if so requested by such person

(iii) identify the substance for which a name is being considered

(iv) set forth the time within which comments and objections will be received and the person and place to whom they should be directed

(v) state the authority under which the World Health Organization is acting and refer to these rules of procedure

C In forwarding the notice the Director General of the World Health Organization shall request that Member States take such steps as are necessary to prevent the acquisition of proprietary rights in the proposed name during the period it is under consideration by the World Health Organization

4 Comments on the proposed name may be forwarded by any person to the World Health Organization within four months of the date of publication under article 3 of the name in *WHO Chronicle*

5 A formal objection to a proposed name may be filed by any interested person within four months of the date of publication under article 3 of the name in *WHO Chronicle*

A Such objection shall

(i) identify the person objecting

(ii) state his interest in the name

(iii) set forth the reasons for his objection to the name proposed

6 Where there is a formal objection under article 5 the World Health Organization may either reconsider the proposed name or use its good offices to attempt to obtain withdrawal of the objection Without prejudice to the consideration by the World Health Organization of a substitute name or names a name shall not be selected by the World Health Organization as a recommended international non proprietary name while there exists a formal objection thereto filed under article 5 which has not been withdrawn

7 Where no objection has been filed under article 5 or all objections previously filed have been withdrawn the Director General of the World Health Organization shall give notice in accordance with subsection A of article 3 that the name has been selected by the World Health Organization as a recommended international non proprietary name

8 In forwarding a recommended international non proprietary name to Member States under article 7 the Director General of the World Health Organization shall

A request that it be recognized as the non proprietary name for the substance and

B request that Member States take such steps as are necessary to prevent the acquisition of proprietary rights in the name including prohibiting registration of the name as a trade mark or trade name

GENERAL PRINCIPLES FOR GUIDANCE IN DEVISING INTERNATIONAL NON PROPRIETARY NAMES

- 1 Names should, preferably be free from any anatomical physiological pathological or therapeutic suggestion
- 2 An attempt should first be made to form a name by the combination of syllables in such a way as to indicate the significant chemical groupings of the compound and/or its pharmacological classification. Preference should be given to the following syllables

<i>Latin</i>	<i>English</i>	<i>French</i>	
in m	ine	ine	for alkaloids and organic bases
olum	ol	ol	for alcohols and phenols (-OH group)
alum	al	al	for aldehydes
onum	one	one	for ketones and other substances containing the CO group
enum	ene	ène	for unsaturated hydrocarbons
anum	ane	ane	for saturated hydrocarbons
cainum	caine	caïne	for local anaesthetics of the procaine type
mer	mer	mer	for mercurial compounds
sulfonum	sulfone	sulfone	for sulfone derivatives
quinum	quine	quine	for antimalarial substances containing a quinoline group
crinum	crine	crine	for antimalarial substances containing an acridine group
sulfa	sulfa	sulfa	for derivatives of sulfanilamide having an antibacterial action
dionum	dione	dione	for anti-epileptics derived from oxazolinedione
tolonum	tolon	tolon	for anti-epileptics derived from hydantoin
stigmatum	stigmine	stigmine	for anticholinesterases of the physostigmine (eserine) type

- 3 Names should be distinctive in sound and spelling. They should not be inconveniently long and should not be liable to confusion with names already in use
- 4 The addition of terminal capital letter or number should be avoided as far as possible
- 5 Names proposed by the person discovering or first developing and marketing a pharmaceutical preparation or already officially adopted in any country or used in national pharmacopoeia or in works of reference such as New and Non-official Drugs should receive preferential consideration.
- 6 Cognizance should be taken of the names of closely related substances and, where desirable, the name should show this relationship

BULLETIN

OF
THE WORLD HEALTH
ORGANIZATION

DE
L'ORGANISATION MONDIALE
DE LA SANTÉ

Health and morbidity survey Seychelles 1956-57—*A J W Spitt*

Food borne infections and intoxications in Europe—*H P R Seeliger*

An estimate of the prevalence of cancer in India—*Subodh Mitra & Ajit Das Gupta*

A review of recent studies of goitre in Italy—*Aurelio Costa & Marcello Mortara*

Safety of malathion dusting powder for louse control—*Wayland J Hayes Jr
Arnold M Mattson J Gordon Short & Robert F Witter*

Susceptibility of body lice to DDT in a heavily treated area of Yugoslavia—*Tibor J Lepes*

Insecticide resistance a review of developments in 1958 and 1959—*Don W Micks*

Studies of the genetics of resistance to parathion and malathion in the housefly—*V D Nguy & J R Busvine*

Trials with a new molluscicide—*R Foster C Teesdale & G F Poulton*

An apparatus for the prolonged and accurate dispensing of suspensions and solutions—*R Foster & G F Poulton*

International Reference Preparation for Vitamin B₁₂—*D R Bangham & Marjorie V Mussett*

International Reference Preparation for Human Menopausal Gonadotrophin—*Department of Biological Standards National Institute for Medical Research London*

Intermediate hosts of *Schistosoma* in Africa some recent information—*G Mandahl Barth*

Notes

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WORLD HEALTH ORGANIZATION

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THIRTEENTH WORLD HEALTH ASSEMBLY—1

The Thirteenth World Health Assembly held in Geneva from 3 to 20 May 1960 was attended by delegations from most of WHO's Member States as well as representatives of the United Nations specialized agencies and international non-governmental organizations in official relations with WHO.

In his opening address the outgoing President Sir John Charles Chief Medical Officer at the Ministry of Health London expressed sympathy with those Member States which had suffered major catastrophes during the previous year.

Two of these catastrophes were due to the forces of nature and one was undoubtedly the consequence of human frailty. In remembering them however we can take pride in the part played by this organization—along with other organizations—in bringing succour and aid to the victims and aid and guidance to the afflicted Member States.

Sir John Charles then referred to "those other activities of the World Health Organization both present and potential which have grown out of the imagination of men which reason has put into proper shape and form for action and which the will of Member States working through the Organization will bring to final accomplishment." He went on to speak of the "six types of ignorance or failure to use existing knowledge" which according to the 13th-century philosopher and scientist, Roger Bacon were prevalent among doctors.

The first ignorance of which he complained was ignorance of foreign languages so that the physician was often unable to read of new discoveries.

The second field of ignorance concerned the physician's lack of knowledge of the drugs he used, of their name, even of how they could be standardized or prepared, and, above all, of what they cost.

The third fault was that physicians were too fond of wandering and futile discussions which were not based on experience.

The fourth defect concerned their lack of interest in astrology and consultation with the stars, because without such assistance Bacon thought that the

physician would be much more dependent on chance and good fortune.

The fifth field of ignorance was the great neglect of chemistry and of agriculture. Chemistry he was certain would one day disclose the nature of the materials out of which the body is made and agriculture—the knowledge of animal and plant life—would be equally helpful.

His sixth and final source of ignorance was composite. It included dependence on the second-hand statements of other people, the distrust of individual, personal experience and finally the failure to look for truth by the way of experiment. And there Bacon sets out clearly and plainly the need for research into the field of knowledge which is concerned with health and the prevention and treatment of disease. The verification of facts, the gathering together of ascertained and proven facts, the co-ordination of inquiries, the filling in of the gaps in human knowledge—the communication and spread of knowledge—these are the great objectives of medical and scientific research.

And looking back at Roger Bacon—more than six hundred years ago—and at the present time and peering to the future we can see how many of WHO's activities are directed to remove these old and very long-lived ignorances. The multilingual publications of WHO, its seminars, so organized as to prevent futile and fruitless discussions, its standardization of therapeutic substances, its links with FAO and UNICEF over food and nutrition and its pursuit and encouragement of research—all these fulfil the hopes of Roger Bacon. Only in the field of astrology do we seem to be lacking—and I leave that thought with the Director-General.

In conclusion Sir John Charles stated that there were two main types of health problems at present: the largely environmental nutritional and epidemiological problems which confront certain groups of Member States and the health problems of middle-aged and elderly populations in others. WHO was concerned both with the extension of life of the middle-aged and elderly and with providing a "life to be lived and enjoyed in all its fullness by the millions of children who are with us now and who will be added to our numbers—whose destiny it is to inherit the earth."

Other speakers at the opening meeting included Mr Georges Palthey Deputy Director of the European Office of the United Nations who said that public health was so closely linked with economic and social problems that it was difficult to conceive of progress in either field without progress in the other. For this reason there were many joint programmes between WHO and the United Nations which were however linked not just by such programmes but by a deep identity of thought and purpose.

The economic importance of health was also stressed by the third speaker Mr Mekki Abbas Executive Secretary of the UN Economic Commission for Africa who spoke of the economic loss incurred by the Sudan in the winter of 1950-1951 when a high percentage of cotton pickers in the Gezira area were incapacitated by a malaria epidemic. The yield and prices were high and the loss was estimated to be in the region of £3 000 000 a large sum of money for a small country to lose. The Economic Commission for Africa believed in good health for economic development and therefore felt confident that co-operation with WHO was most important. Mr Abbas referred to a problem now faced by newly independent countries in Africa the return to their home countries of a substantial number of expatriate civil servants and doctors leaving an embarrassing shortage of trained public health workers. In this connexion he considered that help might be given by the metropolitan countries formerly responsible for the administration of the newly independent territories as well as by WHO.

By acclamation the Assembly elected Dr H B Turbott Director General of Health of New Zealand as its President. The following were unanimously elected Vice Presidents: Dr Y Ben Abbas (Morocco), Professor R Baranski (Poland), Dr J M Baena (Colombia), Dr M K Afridi (Pakistan) was elected Chairman of the Committee on Programme and Budget and Dr M E Bustamante (Mexico) Chairman of the Committee on Administration Finance and Legal Matters.

Following the elections the new President

read a message from Mr N Krushchev Chairman of the Council of Ministers of the USSR.

"On behalf of the Government of the Union of Soviet Socialist Republics I am sending my best wishes to the participants of the Thirteenth World Health Assembly.

The Soviet Government attaches great importance to the activities of the World Health Organization which is faced with the noble task of promoting the improvement of health of the people of the world over.

Nowadays the rational utilization of the achievements of the genius of man in the realm of science culture and engineering can be instrumental in bringing about considerable success in the field of health protection of the people.

Great achievements have been scored in the Soviet Union in the improvement of the health of the population due to the steady rise in its material and cultural well being as well as through giving medical help free of charge.

The Soviet Union is also doing all in its power to promote international co-operation in the field of health and will render all possible assistance in the realization of the World Health Organization activities aimed at the further development of this co-operation.

The health workers through the medium of their profession are well aware of suffering inflicted on human beings by wars. They should therefore understand especially well that the most important and indispensable condition for fulfilling the tasks of the World Health Organization is the achievement of a lasting peace on earth.

This is why I am deeply convinced that the Thirteenth World Health Assembly will make its contribution to the protection of the sacred cause of strengthening universal peace which is possible solely through general and complete disarmament.

Allow me to express the hope that the Assembly will take important decisions directed at the further expansion of international co-operation in the interests of protecting the health of mankind.

"I warmly wish success to the work of the Assembly and all its participants.

In his inaugural address Dr Turbott spoke of how the idea of world health had gained ground since the early days of WHO.

Developing and developed nations have sat together round the Assembly table. In our early years there was impassioned oratory from the former on the obligations of the latter to do more and more. Participation in the planning for themselves brought realization of responsibilities. Although their own

problems may have been unresolved assistance within their competence was soon being offered to others. Slowly an international team consciousness grew and blossomed enabling our Organization to go from strength to strength. New nations joining us find themselves entangled in the constructive co-operation. As for their early years it may take some time for them to realize that membership combines the art of taking with the art of giving and that every Member State will be concerned in the teamwork of helping others.

Dr Turbott then spoke of the "new and growing challenges" with which the Assembly would have to deal in discussing the programme for 1961: control of pestilential diseases; intensification of medical research; protection against radiation hazards; the recrudescence of venereal diseases; the adaptation of tuberculosis programmes to domiciliary chemotherapy; the evaluation of live poliomyelitis vaccine; the provision of safe water supplies; extended nutrition programmes and studies; and the world shortage of medical teachers and competent health personnel. There were also the problems of particular concern to the more developed countries: chronic illness; heart cancer; and mental troubles adulterated foodstuffs. There was one other field to which Dr Turbott considered WHO should devote more attention: the integration of preventive and curative services.

True [WHO] has held technical discussions on the role of the hospital, the community and has come up with helpful reports thereon. True, where assistance through WHO has been given to develop countries. As a Latin America and Africa the result has usually been the administration of medical services by the health authority services. Well integrated regarding curative and preventive aspects. Yet this is still a pattern difficult to achieve in developed countries though the trend is to reverse in countries most inclined to free enterprise. No sensible person conceives that one integration pattern can suddenly be possible for all the world. Yet that world is experimenting, co-ordinating in free enterprise or in social insurance or public assistance or universal service schemes with a general movement discernible from social insurance to universal service. The World Health Organization as the supreme health authority could interest itself more in the problems of social medicine and throw out guidelines leading to integrated preventive and curative

services. The more the general practitioner, the hospital doctor and the preventive medical officer combine and work together towards commonly accepted objectives the quicker the attainment by all peoples of the highest possible level of health."

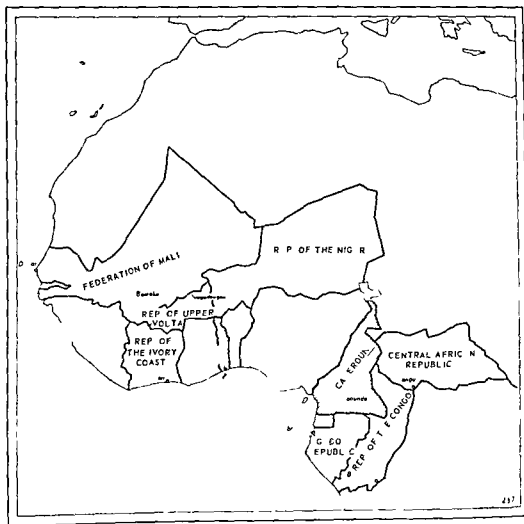
Admission of new Members and Associate Members



The Assembly admitted eleven new Members and Associate Members to WHO bringing the total membership up to 101. The new Members are Cameroon, the Sheikhdom of Kuwait and the Republic of Togoland. The new Associate Members are Cyprus sponsored by the United Kingdom and seven republics at present part of the French Community: Central African Republic, Republic of the Congo, Gabon, Republic of the Ivory Coast, Federation of Mali, Republic of the Niger and Republic of Upper Volta. A number of delegates offered greetings to the newly elected Members and Associate Members. The chief delegate of Ghana spoke of the increasing number of African States and the greater opportunities for international co-operation afforded by their membership of WHO.

Report of the Director General

Presenting his report on the work of WHO during 1959, Dr M. G. Candau, Director General of WHO, expressed his satisfaction at the admission of a number of new Members and Associate Members to the Organization but regretted that so far the last three inactive members—the Byelorussian SSR, Hungary and the Ukrainian SSR—had not yet found it possible to take advantage of the terms offered by the Ninth World Health Assembly to resume active participation in the Organization's work. Dr Candau then went on to deal with the question of malaria eradication which he considered to be "the most serious problem the Organization is facing today and will continue to face in the years to come." His statement on this subject will be found on page 264.

An account of the discussions on the Director General's report will appear in the next number of the Chronicle.



 *New Members*
 *New Associate Members*

- Cameroun—Area 143 415 square miles Population 3 187 000 Capital Yaoundé (pop 32 000)
 Republic of Togoland—Area 20 404 square miles Population 1 085 200 Capital Lomé (pop 39 200)
 Central African Republic—Area 238 000 square miles Population 1 130 000 Capital Bangui (pop 77 000)
 Republic of the Congo—Area 139 000 square miles Population 760 000 Capital Brazzaville (pop 99 000)
 Republic of the Ivory Coast—Area 127 520 square miles Population 2 487 000 Capital Abidjan (pop 127 000)
 Gabon Republic—Area 102 290 square miles Population 403 000 Capital Libreville (pop 70 000)
 Republic of Upper Volta—Area 106 011 square miles Population 3 472 000 Capital Ouagadougou (pop 32 000)
 Republic of the Niger—Area 458 976 square miles Population 2 400 000 Capital Niamey (pop 70 000)
 Federation of Mali (comprising Republic of Senegal and the Sudanese Republic)—Area 539 584 square miles Population over 6 000 000 Capital Dakar (pop over 250 000)

Budget for 1961

An effective working budget of \$18 975 354 for 1961 was approved. This sum is higher than that originally proposed by the Director General the additional items being \$200 000 to finance supplementary assistance for new Members and Associate Members and newly independent or emerging states and almost \$706 000 for the extension of the use of Russian in WHO publications.

Malaria eradication

A report on the development of the malaria eradication programme was discussed at length. Based mainly on replies to a questionnaire sent to WHO by governments at the end of 1959 the report included a number of tables showing the status of the various antimalaria programmes in operation throughout the world. Introducing it Dr P. M. Kaul, Assistant Director General of WHO, noted with satisfaction that most of the countries where malaria was endemic now have or are preparing to have eradication programmes. Since the world wide attack on malaria is limited in time it may be more adversely affected by staffing shortages than any other health programme. Over 1000 million people still live in the malarious areas of 133 different countries or territories but the national professional staff fully employed in eradication programmes amounts to not more than one to every 700 000 people at risk. The most severe shortage is of sanitary engineers and epidemiologists though some countries are making good use of lay volunteers for case finding.

Dr Kaul stressed the need for very careful preliminary planning and geographical reconnaissance so that spraying programmes may be completed efficiently and within the specified time. These programmes are some times hindered by operational difficulties but despite this at least 100 million houses were sprayed with some 50 000 tons of insecticide during 1959. Where residual spraying alone cannot interrupt malaria transmission mass drug administration is being attempted in pilot areas. The large scale distribution of

medicated salt (Pinotti method) has started in the Amazon valley of Brazil. This method is now being utilized in a trial area in Netherlands New Guinea and further trials are being planned elsewhere.

The discussion covered a wide range of technical and administrative questions e.g. the need for improving procedures for epidemiological evaluation research requirements whether eradication programmes should be autonomous or part of the public health services and the best and most economical means of carrying out the work. It was suggested that WHO might provide guide books on methodology and the training of personnel and that information should be made available on malaria vectors present at international airports.

The Assembly noted that satisfactory progress had been made in the world wide malaria eradication campaign and "recognizing that it is important to keep constantly in mind the essential element of urgency in malaria eradication programmes which must be time limited programmes" urged governments "to intensify their efforts for the training and provision of adequate technical and administrative personnel" and "to accord to their national malaria eradication programmes the priority needed for the successful completion of the campaign within the shortest period of time". Governments were asked to keep WHO regularly informed of the progress of their campaigns and in particular of their epidemiological assessment activities. The Director General was asked to continue to provide the necessary technical advisory services and "to establish an official register listing areas where malaria eradication has been achieved after inspection and certification by a WHO evaluation team".

The Assembly also noted that in many cases malaria eradication was reducing the incidence of other vector borne diseases. Governments were therefore asked to consider supplementary measures which might consolidate this advantage and it was recommended that the Director General provide specialized staff and consultants to advise governments on this matter.

As of 30 April 1960 the total contributions received or pledged since the establishment of the Malaria Eradication Special Account amounted to \$12 124 702 of which over 90% was contributed by the United States of America. The balance remaining after deduction of the expenditure for 1957 1958 and 1959 fell short by \$797 760 of the amount required to finance operations planned under the Account for 1960 and by \$7 228 098 of the amount required to finance operations planned for 1960 and 1961. The total number of countries which had made or pledged contributions was 45 of which 14 had pledged or contributed more than once. While the situation had improved somewhat in recent months many countries contributing or pledging greater amounts than before it was still unsatisfactory.

The Assembly considered that a stage has definitely been reached when the financing of the Organization's eradication programmes through the Malaria Eradication Special Account on a voluntary basis will no longer be possible without the full support of all the economically more privileged countries of the world. It noted that a number of countries had recently made or pledged bigger contributions and expressed the hope that this example would be followed by others. It reiterated its appeal to Member States and to foundations industry labour organizations institutions and individuals to contribute to the Account and decided to reappraise the situation at the next Assembly which should sufficient contributions not be forthcoming should consider appropriate measures to ensure the financing of the programme.

Smallpox eradication

Considerable progress towards the world wide eradication of smallpox was made in 1959². Full support for this programme was affirmed by a number of delegates and details were given of the progress of campaigns in various countries. The danger of reintroduction of the disease was constantly emphasized

during the discussions. The delegate of the USSR considered that progress in smallpox control was not sufficiently rapid and that WHO must give direct assistance to a number of countries in this field. As an example of outside assistance he referred to a mass eradication campaign carried out in Iraq with help from the USSR within a short time. 85% of the population had been vaccinated. Smallpox had been eradicated in the USSR since 1934 and when a case was imported last year immediate action was taken by the Government approximately 10.5 million people in the Moscow area being vaccinated within 10 days. The Government of the USSR was prepared to consider supplying consultants and equipment to supplement WHO assistance to countries where the disease was still prevalent.

The Assembly emphasized the urgency of achieving world wide eradication and urged the health administrations of countries which had not yet started eradication campaigns to give the programme high priority. The Director General was asked to continue to provide under the programme and budget for future years for assistance to national health administrations in organizing and developing smallpox eradication programmes.

Radiation health

The question of radiation health including the protection of mankind from ionizing radiations whatever their source was discussed at length. A report presented to the Assembly by the Director General reviewed the potential health hazards from ionizing radiation from natural and artificial sources and gave information on work now being done on radiation protection by the various organizations concerned.

Three resolutions on this subject were proposed one by the United Arab Republic delegation (which did not come to a vote) expressed the desire to safeguard mankind from the possible hazards resulting from radiation of all kinds including atomic fall out.

A second submitted by the USSR dele-

² An article on this subject will appear in the next number of the Chronicle.

tion and later withdrawn asked the Assembly to appeal for "the conclusion of an international agreement for the prohibition of atomic weapon tests"

The third resolution which was finally adopted was sponsored by 21 Member States. It noted that WHO's responsibilities included protection from radiation hazards and the development of the medical uses of radiation and radioactive isotopes and also that health authorities have a responsibility for the prevention and control of health hazards associated with radiation from all sources. The Director General was accorded in ly requested to continue the constructive co-operation of WHO with the International Atomic Energy Agency (IAEA) and other appropriate agencies to help Member States extend and develop the competence of health laboratories to deal with radiation and radioactivity and to provide assistance to States without the requisite laboratory facilities to place special emphasis on the teaching and training of technical personnel within Member countries and to encourage and assist national health authorities to accept their major role and accelerate their activities in this field.

Several of the delegates sponsoring the resolution stated in the discussions that they were opposed to the experimental testing of atomic weapons but felt that this was a political matter which should be and was being dealt with by the United Nations. They urged that WHO should confine itself to those technical questions relating to health which remain outside the field of politics.

Intensified programme of medical research

The first meeting of the Advisory Committee on Medical Research was held in October 1959 and reviewed the proposed 1960 and 1961 medical research programme. It did not recommend any particular priorities in subjects for research since it felt that these were already determined by the evolution of WHO's programme. Nevertheless it considered that within certain broad subjects—e.g. tuberculosis, cancer and cardio-

vascular diseases—high priority should be given to services to research such as standardization, establishment of reference centres and training of research workers.

The Assembly endorsed the action taken by the Director General to implement the research programme and recommended that "governments give due attention to the development of the sciences basic to medical research and to the training of professionals in these basic medical sciences". The Director General was also asked to stress this type of training in the programme.

Membership of the Executive Board

The following six States were elected as Members entitled to designate a person to sit on the Executive Board: Argentina, Ghana, Jordan, Republic of Korea, Thailand and the United Kingdom. The twelve other members of the present Executive Board are persons designated by the following countries: Brazil, France, Guatemala, Iran, Ireland, Luxembourg, Nepal, Peru, Sudan, USSR, Venezuela and Viet Nam.

Forty-four Member States had ratified the amendment to the Constitution increasing membership of the Executive Board from 18 to 24. As this amendment cannot come into force until it has been accepted by two-thirds of the Member States, those which had not yet ratified it were urged to do so if possible before the Fourteenth World Health Assembly.

Headquarters accommodation

The Assembly authorized the construction of the new Headquarters building in Geneva (see article on page 272) and asked the Director General to conclude the necessary arrangements with the Swiss Confederation and the Canton of Geneva and to arrange for the contracts with the architects, builders and suppliers. Governments of Member States, foundations, institutions, other agencies and individuals were asked to consider making voluntary contributions to the Headquarters Building Fund as well as gifts of furnishings, decorations and equipment.

During the Assembly the Ghana delegation announced a voluntary contribution of £1000 from its Government to the Fund

World Health Year

The question of holding a World Health Year was once more discussed. This idea originated in a proposal by the delegation of the Ukrainian SSR to the General Assembly of the United Nations which subsequently invited WHO to organize an observance of this nature to be held preferably in 1961. This invitation and an associated proposal by the Government of the USA were discussed by the Twelfth World Health Assembly at which opinion on the subject was sharply divided. It was therefore decided to reconsider the matter at this year's Health Assembly. In the meantime the Director General asked Member States and the Regional Committees to give their opinions and those received were assembled in a report presented to the Assembly.

A majority of the speakers on this subject considered that the time was not propitious for WHO to undertake a venture of this kind when money and personnel were urgently needed to carry out both current and planned health projects. The Assembly considered that the efforts and expenditure involved in the holding of a World Health Year were unlikely to be commensurate with the benefits that might be derived from it and that they would be better used for a critical review and evaluation of the current programme and projects. It was therefore recommended that the holding of a World Health Year be postponed indefinitely.

Disarmament and funds for health

The Assembly examined an invitation from the United Nations General Assembly asking States to consider the possibility of devoting out of the funds made available as a result of disarmament as and when sufficient progress is made additional resources to the improvement of living conditions throughout the world and especially in the less developed

countries. While expressing the hope that current negotiations might lead to greater progress towards the attainment of disarmament under effective international control it considered that until this progress had been made it would be premature to study the question of the utilization of any resources released thereby. It also affirmed its belief that international co-operation in the furtherance of the objectives of the World Health Organization should not pause in its efforts while waiting for such disarmament.

Voluntary Fund for Health Promotion

The Assembly decided to establish a Voluntary Fund for Health Promotion amalgamating existing special accounts with the exception of the Malaria Eradication Special Account. The following sub-accounts are thus included in the Fund General Account (for undesignated contributions) Special Account for Smallpox Eradication Special Account for Medical Research Special Account for Community Water Supply.

Relations with the League of Arab States

The Assembly approved the principle of concluding an agreement between WHO and the League of Arab States for co-operation in the field of health and asked the Director General to take the necessary steps to this end.

Publications in Russian

It was decided to extend the use of the Russian language in certain WHO publications the extension to take place gradually over a period of three years beginning in 1961.

Establishment of national public health cadres

The Assembly recommended that governments establish career appointments for

public health personnel and that WHO give whatever assistance it can in this connexion

Technical discussions

The technical discussions at the Assembly were on "The Role of Immunization in Communicable Disease Control". A summary of these discussions will appear in the next number of the Chronicle

Fourteenth World Health Assembly

The Assembly accepted the invitation of the Government of India to hold the Fourteenth World Health Assembly in New Delhi in February 1961 and expressed appreciation of the Government's offer to meet \$250 000 of the extra costs of holding the Assembly so far away from Headquarters

Dr H B TURBOTT

President of the Thirteenth World Health Assembly



The new President of the World Health Assembly Dr Harold Bertram Turbott ISO MB ChB DPH was born in 1899 in Auckland New Zealand and studied at the Medical School University of Otago Dunedin. After working in China and on the staff of the University of Otago Medical School Dr Turbott joined the New Zealand Department of Health in which he has served as Director of Child Hygiene Deputy Director General and since last year as Director General. He has been responsible for many innovations which are now standard practice in the New Zealand public health services and under the auspices of the Medical Research Council of Great Britain has conducted an investigation into the health of the Maoris. He has been associated with WHO since its earliest days and has been a regular member of the New Zealand

delegations to the various World Health Assemblies besides representing his country on the WHO Executive Board from 1957 to 1955. In 1959 he served as Chairman of the Programme and Budget Committee of the Twelfth World Health Assembly. He is also New Zealand representative on the WHO Regional Committee for the Western Pacific on the Research Council of the South Pacific Commission and on the South Pacific Board of Health.

During the Assembly the Ghana delegation announced a voluntary contribution of £1000 from its Government to the Fund

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Establishment of national public health cadres

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conditions which as we all agreed had to be met if the eradication of the disease on a world wide level was to become a reality—before anopheline resistance to insecticides became widespread thus jeopardizing the gains achieved in the preceding fifteen years

As for all programmes supported or initiated by WHO the first essential condition in this fight against malaria is the whole hearted participation of the individual countries concerned. In 1955 we expected that the governments of all countries and territories affected by malaria would mobilize their maximum available resources to this vast eradication work. We also hoped that they would take maximum advantage of all available assistance which should be given to them to the extent required. Let me say at once that these hopes have in large measure been fulfilled. In spite of their very often precarious budgetary situation the countries undertaking malaria eradication managed in 1958 to spend a total of close to \$80 million and in the last two years this rate of expenditure has further increased. What is even more significant many if not all the countries carrying out eradication programmes realize the importance of international co-operation and many examples of the granting of frontier facilities and of the prompt and free exchange of information on the malaria situation are being reported from various parts of the world. Among at least one group of countries an international agreement provides for mutual aid in case of need by the transfer of personnel equipment and stores from one country to another on request and at cost price.

This bright side of the picture can be enhanced by describing the successful way in which WHO in my opinion has discharged the principal responsibility assigned to it in 1955 to provide leadership in determining the over all strategy for world wide malaria eradication. You will see that our antimalaria work has greatly profited from the experience the Organization has accumulated as a result of the many international health projects it has carried out since the days of the Interim Commission.

Thus for instance with the assistance of

expert committees and panels the whole strategy of malaria eradication is under constant study and review. The problem of resistance is studied and attempts are made to solve it. Standard specifications of insecticides and pesticides are issued periodically to all countries. Other functions of WHO are the standardization of equipment and its improvement and the study and prevention of the toxic hazards of insecticides and pesticides. In addition to that the Organization has during the past year greatly increased its activities leading to stimulation co-ordination and assistance to basic and applied research.

WHO's fellowship system and the various means it has established for the education and training of medical and allied personnel are being used to provide countries with the several different categories of staff they badly need for the planning and implementation of eradication campaigns. Internationally trained experts are indispensable in countries with an acute shortage of qualified technical personnel. But experience has also shown the great value of international advisers even when adequate numbers of highly qualified national personnel are available. During 1959 there were close to four hundred technical advisers from WHO and the Pan American Health Organization working for national or regional projects.

While WHO sometimes provides supplies and equipment also its main function remains that of showing each individual country how it can best establish the essential conditions for eradication operations to be carried out effectively and quickly. Indeed sound planning adequate financing and appropriate legislation are indispensable to support the technical work there must be a strong national service devoted to this combined task having well trained personnel and sufficient administrative autonomy. Good public relations and effective public health education are needed at every level of society. Finally in all these fields national effort must be supported and supplemented by international assistance.

There is no doubt that the happy combination of national and international effort is

MALARIA ERADICATION A CRITICAL STAGE

Presenting his report on the work of WHO in 1959 to the Thirteenth World Health Assembly Dr M G Candau Director General of the Organization stated that the world wide malaria eradication campaign "has now clearly reached a critical stage which requires urgent action on the part of this Assembly." He went on to speak of the main reasons which had prompted the decision of the Eighth World Health Assembly in 1955 to launch this WHO programme and of the present position Dr Candau's statement is reproduced below

The obvious purpose of the malaria eradication campaigns as of the control projects which preceded them is of course a humanitarian one the will to put an end to the hardship and misery of hundreds of millions of people affected by this most widespread of the communicable diseases and to ensure adequate protection for those who are still exposed to this infection. In the light of the increasing resistance of insects to insecticides—the very factor which was mainly responsible for the adoption of eradication as the only valid approach to the problem of malaria—no country however safe it may appear now can be considered fully protected from the disease. Indeed in the past malaria had completely disappeared from many lands only to reappear later in explosive epidemics. And if it is true that our counter measures are today much more effective than ever before it is also true that the increasingly rapid and voluminous international transport and travel of our time considerably intensify the danger of reintroduction of malaria into all the countries where the mosquito vector is present.

But humanitarian and health considerations—strong as they are—were not the most important arguments which determined WHO to spare no effort and to make every sacrifice to reach the goal of world wide eradication of this disease. In addition to being the most nearly universal malaria is also the most costly among the communicable diseases. The economic loss exacted by it defies calculation even in the last decade when the rate of infection was reduced considerably. Indeed malaria as long as it

remains endemic will be responsible for heavy hospital costs cause absenteeism slow down the pace of production and hamper education. It increases the death rate due primarily to other diseases moreover much malaria mortality occurs in childhood thus causing the wastage of potentially useful members of the community.

Above all malaria is the most important single obstacle to the development of the economic and social potentials of the under developed areas of the world. Wealth cannot be built on ill health and malaria is undoubtedly one of the main causes of illness in most of the countries of Asia Africa and the Americas. The economic advantages which are bound to result from the elimination of this disease were already envisaged by Ronald Ross. Speaking more than fifty years ago to the Liverpool Chamber of Commerce he made that truly visionary statement. It may even happen that such a wild idea as killing mosquito grubs to prevent malaria may assist in giving to civilization the gift of another half of the world the tropics. We never know when we plant one of the seeds of science into how great a tree it may grow some day."

So much for the main reasons why malaria considered as a first priority in WHO's programme since its very inception has also become the principal target of the Organization's health promotion policy and why at this Assembly we must face the challenge it presents to the world as a whole. In order to facilitate the study of this issue I should now like to recall the very premises on which the decision taken in 1955 was based and the

development to which we are all dedicated. The costs of one essential activity therefore cannot and must not encroach on the resources required for other equally essential activities.

We are then led to the conclusion that the responsibility for providing the necessary funds to finance the relatively small share of the costs of the malaria eradication programme for which the World Health Organization is responsible rests with the Organization itself and with those of its Members better able to bear them. Developments in the past several months lead me to believe that we are fast approaching a critical point in our efforts to obtain funds from voluntary contributions to finance WHO's share of the costs of this great programme and that unless

we obtain the necessary voluntary contributions the next World Health Assembly will need to examine and decide upon other solutions including the possibility of adding the amounts required for malaria eradication to the regular budget of the Organization.

At the present rate of progress malaria could be eradicated within the next ten years or so at least from Europe, the Americas, North Africa and large parts of Asia. We must find the few million dollars which are needed to sustain the many national eradication programmes which are being constantly intensified. After this initial effort of the next few years the remaining problem should be solved with resources provided in the regular budget of the Organization without disturbing the balance of our total programme.

International exchange of duplicate medical literature

On 1 February 1960 the Library of the World Health Organization initiated a new scheme for the international exchange of duplicate medical literature which is open to all interested libraries irrespective of size or geographical location. It is intended to co-operate to the fullest possible extent with existing exchange schemes and to supplement the work already being performed at the national level. One of the chief principles of the new scheme therefore is that participating libraries should first clear their requests and offers through their national exchange centre where it exists and is willing to co-operate.

The WHO Library will not handle the duplicate material but will act as a clearing centre for information, creating the necessary contact between the library requiring certain material and the library offering the same material for disposal. It will provide libraries with stencils for the preparation of book lists and transparencies for preparing lists and cataloguing the periodicals required and offered. The book lists will be circulated to all participants but the periodical lists will be photocopied and filed in a central card index in Geneva enabling requesting libraries to be notified of appropriate offers. The participating libraries will then be expected to carry out the exchange transactions directly. No charges will be made except of course the reimbursement of postage by the recipient to the donating library. It should be noted that this new scheme is not intended to deal with the regular exchanges established between current periodicals and other newly published material.

For further information interested libraries should apply to World Health Organization Library and Reference Services, Palais des Nations, Geneva, Switzerland.

responsible for the very substantial success already obtained by the world wide malaria eradication campaigns. By the end of 1959 out of a total of 1400 million people either affected by malaria or living in areas exposed to it close to 280 million were freed from the threat of the disease. According to the latest information received at headquarters 62 countries or territories containing a population of 684 millions are today fully engaged in eradication work. In 16 other countries or territories inhabited by 127 million people the health authorities are on the point of establishing final plans for eradication campaigns.

Another factor which augurs well for the future is the continued improvement of the co-ordination between inter-country and inter regional projects. The annual report of the work of WHO in 1959 contains significant data on this subject.

On the debit side there have been during the last four months some new reverses. Small foci of resistance of *P. vivax* to pyrimethamine have now appeared in West Africa in western Venezuela and in Netherlands New Guinea. The number of malaria vectors resistant to some residual insecticides had reached 22. During the first three months of 1960 resistance to dieldrin was reported in *A. albimanus* in Haiti and *A. sundaeus* in Indonesia.

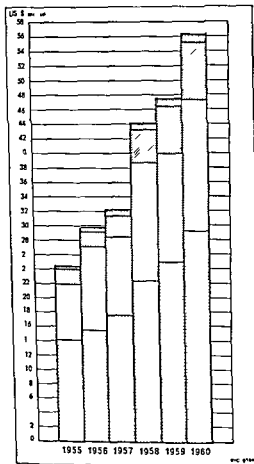
The problem of the resistance of malaria vectors to insecticides is undoubtedly an obstacle to malaria eradication and has slowed down in some countries the progress of our endeavour. Nevertheless its importance should not be overemphasized since experience shows that the obstacles created by the problem of resistance can be eventually overcome by technical developments. Administrative improvements are in many ways even more important and this certainly is one of the conditions of final success.

On the other hand the unsolved question is that of indispensable funds for the international technical assistance and guidance. More than three quarters of the cost of the eradication programmes is being borne by those countries which have to contend with malaria. The remainder is at present being

borne by UNICEF the Expanded Programme of Technical Assistance other multilateral and bilateral agencies and of course by WHO. It had been hoped that when the Health Assembly established the Malaria Eradication Special Account in 1955 WHO's share in the campaign would be financed by voluntary contributions to that Account. Unfortunately as I have had to report on previous occasions with the exception of the contribution of one country which alone has provided more than 90% of the funds available in the Special Account actual contributions still continue to lag far behind good intentions and assurances of support. As a result the Account is \$7 million short of the amount needed for the activities planned for the period 1960-1961 and WHO finds itself in a difficult situation.

While there have in the past been suggestions from some quarters that greater resources for malaria eradication should be obtained from the various international sources of funds designed for economic and social development I believe that in the present situation such ideas are unrealistic and not necessarily in the best long term interests of the countries fighting malaria nor of the World Health Organization itself. The World Health Assembly and the Executive Board have repeatedly reiterated the inseparability of health and social and economic factors in the development of the well being of mankind. It is necessary to that well being to maintain an appropriate balance in the activities of WHO and of the United Nations family as a whole. The eradication of malaria—as indeed any major improvement in the health of mankind—leads not only to greater individual health but contributes most importantly to the availability of effective manpower for economic and other social developments. But that alone is not enough: that manpower needs to be utilized to its fullest extent and the healthy individual should be able to satisfy his basic aspirations if we are effectively to contribute to a happier and more stable world. To this end the United Nations family including WHO must be able to carry out its manifold responsibilities for assisting in the total social and economic

CHART 1 TOTAL FUNDS DEVOTED OR EXPECTED TO BE DEVOTED TO INTERNATIONAL HEALTH PROGRAMMES FOR THE YEARS 1955-1960 FROM ALL SOURCES



- Funds administered by WHO
 Other Source
 UNICEF (funds allocated or expected to be allocated for its regular programme)
 PAHO (including Special Malaria Fund and special accounts for the common malaria control programme)
 Various

shows that UNICEF and PAHO also contribute large sums. UNICEF's close co-operation with WHO in international health programmes is derived from its concern with

children who must be of primary importance in nearly every health programme. PAHO, the Pan American Health Organization, is one of the earliest international health organizations and its executive office, the Pan American Sanitary Bureau (PASB), acts as the WHO Regional Office for the Americas. The remaining funds devoted to international health programmes are provided by such agencies as the Organization of American States, the Institute of Nutrition of Central America and Panama, the Government of Argentina (for the Pan American Zoonoses Center) and the Government of Venezuela (for the Caracas Zone Office).

What is the money spent on? In order to ensure co-ordination and continuity, WHO prepares an integrated health programme in conjunction with the other agencies interested in this programme for the years 1955-1960, as set out in Table 1. Some of the items listed in this table require a word or two of explanation. Malaria eradication is not part of the regular WHO budget. The Eighth World Health Assembly decided that WHO should provide technical advice, encourage research, and co-ordinate resources in a special programme having as its ultimate objective the world-wide eradication of malaria, and a special account was set up into which contributions from governmental and private sources could be credited. Similar special accounts have been set up for the planning of research—a study of WHO's role in research and ways in which it might assist in stimulating and co-ordinating it for medical research—extension of WHO's assistance in medical research programmes and for a community water supply programme—a programme of self-evident value that would by itself go far to reduce the incidence of the diarrhoeal diseases in many of the less developed countries of the world.

In addition to the work carried out under its regular budget and under the various special accounts, WHO has also since 1951 looked after the health aspects of the general economic development programmes of the United Nations Expanded Programme of Technical Assistance for the Economic Development of Under Developed Countries.

THE PRICE OF HEALTH

The task is a vast and difficult one. It is particularly challenging to the World Health Organization because it seems clear that a public health programme adapted to the individual needs of each area offers the most economical method of breaking the chains of disease and poverty and initiating an upward cycle of social evolution. To accomplish the end in view, two things are necessary. The first essential is an analysis by each country—at whatever stage of health evolution it may be—of the most vital health problems which may be attacked with maximum results at minimum cost. The second essential is the development of co-operative programmes of technical assistance in which the more fortunate areas may co-operate with those of less advanced development for the common goal of a healthful, prosperous and peaceful world."

C. E. A. WINSLOW *

How much money should be spent on international collaboration in public health? Few if any of the questions that have regularly come before WHO's governing bodies since the foundation of the Organization have remained more stubbornly controversial.

At the Third World Health Assembly in 1950 Dr Karl Evang of Norway, the President of the previous Assembly, spoke for a number of countries when he pointed out that

If half or one third or even one tenth of the present scientific knowledge of medicine had been spelt out in terms of public health administrations, hospitals, sick insurance schemes, doctors, nurses and auxiliary personnel in a proper production and distribution of drugs and insecticides, medical literature and equipment, the picture of the whole world would have been very different indeed from that which meets the eye today.

The vast majority of the peoples of the world still live in bondage to disease and misery. Science knows the means to rapid improvement and we know how to administer the proper health measures. We are not dreamers but practical men. Nevertheless a majority of the Member countries themselves voted a budget for WHO which is disastrously inadequate. Why has this situation arisen and why do we uphold it? I am not offering an explanation because I know of none which would satisfy you and me."

At the same Assembly, however, dissenting voices expressed concern lest the Organization attempt to cover too much ground superficially and pointed out that it was essential to limit its activities to work that could only be done through international machinery or particularly lent itself to international action.

That international funds should be spent sparingly and primarily to help countries face problems for which their own resources are inadequate has been repeatedly emphasized by representatives of all governments and is one of the fundamental principles on which international work rests. But as programmes of assistance justified themselves by their results, more requests for aid of all types were submitted by governments to WHO, indicating the need for yet more expenditure on international aid and the budgets voted by the World Health Assembly increased from year to year. At the Eleventh World Health Assembly in 1958, the effective working budget proposed by the Director General for the following year—embodying a substantial increase of some \$721,000—was adopted not after painful discussion but by acclamation for the first time in the Organization's history.

In 1960, the total amount devoted to international health programmes is expected to be over \$56 million. Not all of this money is contributed by WHO, although a large portion is. The accompanying chart (Chart 1)

TABLE 2. DISTRIBUTION OF ORDINARY BUDGET
1960 AND 1961

P p s e f p e d t	P e t d e f t o t l		
	1960	1961	
		(a)	(b)
P t I—O g z t n a l M t g	282	266	273
P t II—O p a t i g P g r a m m			
P o g m m A t t	56.99	56.23	57.79
R g i O f f	10.74	10.04	10.32
E p r t C m m t t	1.29	1.12	1.15
O h S t i t u t o r y S t f C t	18.63	18.16	18.66
T t l—O p t g P g m m	87.65	84.55	87.92
P t III—			
A d m i t r t S r v			
A d m s t t S e r v	7.54	7.06	7.25
O h S t i t u t o r y S t f C t	1.99	.04	1
T o t l—A d m t t S r v	9.53	9.10	9.35
P t IV—O t h P p			
H d o n B l d g F d	—	2.69	—
	100.00	100.00	100.00

(1) I P a t I V — O t h P u p
(b) E I P a t I V — O t h P p

ment of international standards relating to various aspects of health (the drawing up of international sanitary regulations) and direct services to governments

Services to governments aim at strengthening national services by the encouragement of long term health planning research evaluation of the health work being done and professional and technical education of national health personnel. Assistance is not offered to governments they must themselves ask for it. Nor is it given unconditionally. In any project in which WHO provides assist

ance the government concerned must maintain administrative control, furnish counterpart and other personnel and make provision for the continuation of the project on the termination of WHO assistance. The assistance takes various forms: consultants, demonstrations, training courses, seminars, fellowships, visiting groups of scientists, grants to training institutions and research centres to stimulate productive research, supply (on a small scale) of specialized equipment for laboratories and occasionally provision of specialized technical literature.

It should not be forgotten however that the cost of internationally assisted health programmes cannot be reckoned in terms of international funds alone. There is the even larger contribution made by the assisted countries themselves. Thus in 1958 the total cost to the Organization of WHO assisted projects in 115 countries and territories was \$13 141 000; the counterpart national contributions to these projects as reported by recipient governments exceeded \$75 000 000. In many cases the national contributions would not have been available but for the stimulus of international assistance. In this connexion Dr H. B. Turboitt, President of the Thirteenth World Health Assembly, stated in his presidential address:

As national health men we all experience the frustrations inherent in national control of finance where competing interests delay that progress in national health which we see so clearly could be achieved so quickly if only we had the means. Enter the World Health Organization with its supplemental offer of technical assistance and financial aid but of real substance. I help in the planning, training and action aspects of programmes for health betterment. From this stimulation—for that is all it is—stems our success. The country being helped responds, participates in greater degree than previously thought possible by its Government, is caught up in teamwork with other countries to safeguard its newly enhanced achievement.

The variety of tasks entrusted to WHO is carried out by a staff (which must necessarily increase as the work increases) scattered over the four corners of the globe—at Headquarters in Geneva, in the six regional offices or in the field. Chart 2 shows the composition

TABLE 1 THE INTEGRATED INTERNATIONAL HEALTH PROGRAMME 1955-1960

	1955	1956	1957	1958	1959	1960
	US \$	US \$	US \$	US \$	US \$	US \$
1 Obligations incurred or expected to be incurred by WHO						
Regular Budget	9 275 300	9 982 794	12 091 421	13 959 238	15 484 230	16 918 700
Malaria Eradication Special Account	—	—	28 247	3 027 213	4 238 932	6 117 612
Special Account for Research Planning	—	—	—	54 790	245 210	—
Special Account for Medical Research	—	—	—	—	—	1 756 600
Special Account for Community Water Supply Programme	—	—	—	—	—	367 300
Expanded Programme of Technical Assistance	4 411 749	5 452 504	5 527 977	5 326 970	4 990 803	4 605 700
Costs reimbursed by UNICEF for projects jointly assisted by UNICEF and WHO	451 538	112 058	47 972	27 117	—	—
Sub total	14 138 587	15 547 356	17 695 617	22 395 388	24 957 235	29 760 419
2 Expenditure incurred or expected to be incurred by other agencies						
Amounts allocated or expected to be allocated by the UNICEF Executive Board for supplies and equipment in projects jointly assisted by UNICEF and WHO	7 770 029	11 351 050	10 328 622	16 207 03	14 979 650	18 125 670
Pan American Health Organization	2 082 230	2 199 966	3 287 678	4 639 768	6 414 070	7 840 879
Other sources	456 034	698 428	690 369	866 056	1 083 499	1 144 478
Total	24 446 880	29 796 800	33 002 306	44 108 178	47 434 447	56 371 419

Including the lump sum allocation to WHO from the Special Account of the Expanded Programme of Technical Assistance towards the administrative and operational services costs of that programme now merged with the regular budget

Including only costs of field projects

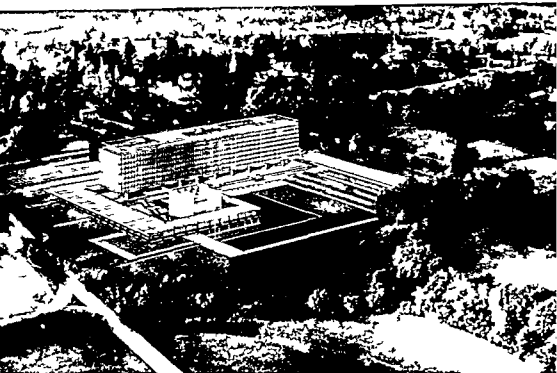
Including operations planned under Special Malaria Fund and the special account of PAHO for the community water supply programme in the Americas

The funds for this programme are derived from voluntary contributions paid by governments

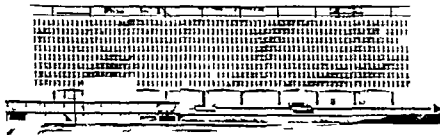
WHO's regular budget covers the cost of operating programmes outside those financed from the special accounts the cost of organizing meetings of the World Health Assembly the Executive Board the expert committees study groups regional conferences

seminars and the like and the cost of the administrative services The relative percentage of each of these items for 1960 and 1961 is shown in Table 2

The operating programmes take the greatest share of the regular WHO budget They include services of general international interest (e.g. the collection and analysis of world epidemiological information the develop-

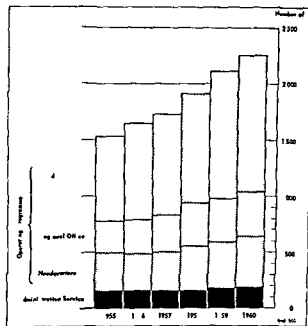


Modell für die Wohnungsgelände von Prof. J. N. Tschumi, Lausanne, Schweiz



Wohnungsgelände für die Stadtplan

CHART 2 TOTAL AUTHORIZED POSTS
FOR THE YEARS 1955-1960



of this staff and the increase that has taken place in the past five years. It must be remembered that included is staff engaged on

malaria eradication and other special projects as well as work for the Expanded Programme of Technical Assistance.

This year the Thirteenth World Health Assembly adopted an effective working budget of over \$18 975 000 for 1961. Most of this sum is made up of contributions from the Members and Associate Members of the Organization. The overwhelming majority of these countries each contribute less than 1 % of the whole though a few countries contribute a higher share: USA 31.71 / USSR 12.48 / United Kingdom 7.13 / France 5.86 % / Federal Republic of Germany 4.88 % / China (Taiwan) 4.59 / Canada 2.85 % / India 2.25 % / Italy 2.06 % / Japan 2.01 / Australia 1.64 % / Sweden 1.27 / Poland 1.25 / Belgium 1.19 % / Argentina 1.02 %.

In addition other funds administered by the Organization during 1961 are expected to amount to approximately \$14 643 000. These sums will enable the Organization to continue its technical support to some 500 projects of all kinds in various parts of the world and to undertake a limited number of others in reply to requests from governments.

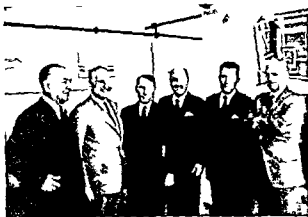
DESIGN FOR NEW WHO HEADQUARTERS

The international architectural competition for the design of a new WHO Headquarters building in Geneva¹ has been won by Professor Jean Tschumi of Lausanne Switzerland. The second prize of Sw fr 25 000 was awarded to Mr Eero Saarinen of the United States and the third of Sw fr 15 000 to Mr J. Dubuisson of France. The design submitted by Messrs Viljo Revell and Co. Helsinki, Finland, received honourable mention. Fifteen leading architects from 12 countries had accepted the invitation to take part in the competition.

The jury for the competition met in Geneva from 25 to 28 April 1960. It consisted of Mr Sven Gottfrid Markelius, architect, Stockholm, Sweden; Mr Gio Ponti, architect, Milan, Italy; Sir Howard Robertson, architect, London, England; Mr Pierre Vago, Secretary General of the International Union of Architects; Professor E. J. Y. Aujaleu, Chairman of the Executive Board of WHO; Mr Jean Dutoit, Conseiller d'Etat, Head of the Public Works Department of the Canton of Geneva; and Dr M. G. Candau, Director General of WHO, who acted as chairman. In accordance with the rules of the competition, the designs were submitted to the jury anonymously.

See WHO Chronicle 1960 14 153

Members of the jury consist of the
 winning design. From left to right
 S. Ho and Robertson M. P. Vag
 M. A. V. ne (deputy of Mr J
 D. to it) D. M. G. Candau P. f. e. s. r
 E. J. Y. A. jaleu M. S. G. Markelus



that the distances between the two ends of the building from the end office to the meeting room and from the mail distribution centre to the end offices should be as short as possible and that there should be a limited number of lifts and staircases grouped centrally for convenience. He discarded the idea of a building with two blocks at right angles in which some of the staff members at work would be presented with a view of their colleagues in other offices. A building with an inner courtyard closed or open on one side was also considered undesirable because of the Geneva climate. More generally Professor Tschumi considered that any design which did not give a view of the city and the lake from the upper parts of the building should be excluded. The openness and simplicity of his final design is intended to give an impression of calm.

Speaking over the Swiss short wave radio service Dr M. G. Candau, Director General of WHO, commented on the winning project as follows:

I personally think that Mr Tschumi's plans have great aesthetic value but practical considerations also guided the jury in their choice, and it seems to me that the plans as they are already meet our needs to a considerable extent.

With their adoption we have taken a great step forward, and it is a happy coincidence that thereby we are once more indebted to Swiss land.

In fact without the generous aid given by the Swiss Confederation and the Canton of Geneva in the form of both money and land we could not have undertaken this project.

Alterations to the design

The author of the winning design was asked to study in conjunction with WHO the possibility of making alterations in his design which would meet certain recommendations and objections on the part of the jury and would enable the project to be carried out within the upper cost limit of Sw fr 40 000 000. These alterations have now been agreed upon: they include a reduction in the depth of the offices; a 6% reduction in the total length of the main building; a reduction in the height of the basements, ground floor and upper storey; and a reduction in the height of the council room.

The building site

On 29 April 1960 the Council of State of the Canton and Republic of Geneva formally submitted to the Grand Council an act expropriating the parcels of land comprising the proposed building site.

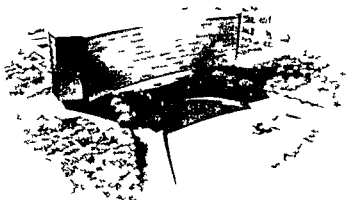
The prizewinning design

The prizewinning design consists of a ten storey block with eight floors of offices and a smaller contrasting block containing a council room. The council room overlooks a pool and a garden patio bounded on the other side by a porticoed wing housing the library and reading rooms.

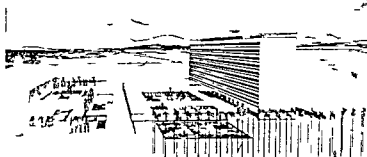
The "curtain" façade of the main block is composed of glass walls with aluminium sun break elements on a framework of reinforced concrete covered with marble. On the ninth floor there is a terrace, cafeteria and lounges. The ceilings of the offices will be soundproof and the offices will have moveable partitions.

In the council room block and library wing the ceilings of the offices will be in a warm blue to harmonize with the white marble of the council hall. The interior of the council room will have its walls covered in various veneers.

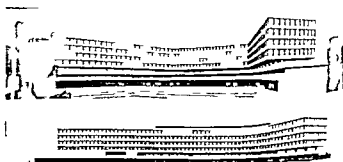
Professor Tschumi—who recently won the Reynolds Prize, an important American architectural award for the new Nestlé administrative building at Vevey, Switzerland—based his design on a number of practical considerations. First of all he decided



*Design submitted by Mr Eero Saarinen United States
(second prize)*

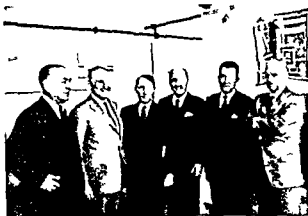


*Design submitted by Mr J Dubuisson France
(third prize)*



*Design submitted by Messrs Viljo Revell
and Co Finland (honourable mention)*

Member of the jury in favour of the
 winning design From left to right
 Swiss Confederation and the Canton of Geneva
 in the form of both money and land we could not
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that the distances between the two ends of the building from the end office to the meeting room and from the mail distribution centre to the end offices should be as short as possible and that there should be a limited number of lifts and staircases grouped centrally for convenience. He discarded the idea of a building with two blocks at right angles in which some of the staff members at work would be presented with a view of their colleagues in other offices. A building with an inner courtyard closed or open on one side was also considered undesirable because of the Geneva climate. More generally Professor Tschumi considered that any design which did not give a view of the city and the lake from the upper parts of the building should be excluded. The openness and simplicity of his final design is intended to give an impression of calm.

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THE PSYCHO SOCIAL ENVIRONMENT IN INDUSTRY

Occupational health stated a Joint ILO/WHO Committee on Occupational Health in 1950 should aim at the promotion and maintenance of the highest degree of physical mental and social well being of workers in all occupations the prevention among workers of departures from health caused by their working conditions the protection of workers in their employment from risks resulting from factors adverse to health the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological equipment and to summarize the adaptation of work to man and of each man to his job¹

The work of the industrial medical officer is thus not confined to running a first aid department in an industrial undertaking but embraces a variety of tasks He must

" make himself technically minded to a degree that used to be thought quite foreign to the sphere of practical medicine

Lighting heating ventilation humidity dust control prevention of emission of toxic gas and fume optimum methods of working weight lifting shift systems ways of avoiding boredom in repetitive work adjustment of human relations detection and removal of sources of friction and fear investigation of processes known or suspected to lead to disease development of physical and chemical methods to determine the absorption by the worker of dangerous compounds maintenance of high standards of hygiene and sanitation control of nutritional standards in canteens development of the best technique for the treatment of injuries and poisoning—all come within the scope of environmental study in the factory and in the laboratory By such detailed study of industrial environment he appreciates the background against which to place new entrants for rehabilitating the injured and partly disabled for choosing alternative work for a man who has been sick and for elucidating possible causes of acute and chronic illness among the workers"²

Things have thus changed greatly from the days when it would not have occurred to the

management of an industrial concern to have a doctor on the premises except to give treatment to an injured or sick worker Indeed the emphasis in modern industrial medicine

is upon people the conditions in which they live and work their hopes and fears their abilities their attitudes towards their job their fellow workers and their employers Of course the industrial doctor must have a practical clinical background which will enable him to assess physical factors in health and disease and detect disease attributable to occupation Far more difficult is the assessment of men and women as emotional beings moved by trivial things overturned by worries and anxieties torn by conscience stunned by the inevitable trial of family life and easily captured by a sense of frustration and persecution It is the interaction of this complex an individual and his industrial environment animate and inanimate that the industrial doctor tries to analyse and from the analysis to establish an equilibrium which permits a stable relationship"³

This complex environment in which psychological and social aspects are inextricably combined was the subject of a Joint ILO/WHO European Conference on the Industrial Medical Officer's Contribution to the Psycho Social Environment in Industry held in London in November and December 1959

Not all of the delegates to the Conference were prepared to admit that the industrial doctor has any part to play in the psycho social field He has it was argued more urgent problems to deal with especially in those industries where toxicological hazards are high and compel him to specialize in this field Even if he does see psycho social problems he has no time to deal with them properly nor indeed should he for they are the prime responsibility of the management one which he should not usurp Moreover he seldom has the skill or the training required to advise In some countries for example the USSR medical advice on

¹ Q noted N Wild *High O g t chn R p S* 1953 66
Hu ter D (1959) *H l h i l d t y* Harmond worth
Pe guin Books p 20

² H ter D (1959) *H l h i l d t y* Harmond worth
P guin Book p 21

psycho-social problems is given to industry not by the works doctor however but by consultant psychiatrists within the enterprise or in community polyclinics

In general however the Conference felt that while the industrial doctor has other urgent problems to deal with they cannot be dissociated from the psycho-social environment. He is often the person best placed to deal with psycho-social problems when they crop up and if he has not time to deal with them it is his responsibility either to revise his duties so as to be able to deal with them or to ask for extra assistance just as it is the responsibility of management and workers to see that he is given an opportunity to perform this difficult function. His task is however to advise not to take action the prime responsibility for action on psycho-social problems lies with the management of the works. Few industrial physicians it must be admitted are specifically trained to deal with these problems but many have learned to do so by experience and doctors employers and workers are responsible for exerting pressure to secure more specific training in the future. Different countries have different systems for dealing with psycho-social problems differences that can be studied with benefit by all concerned. Even if the doctor is not concerned directly he may be so indirectly and regular meetings between the people responsible are therefore needed.

The industrial enterprise is influenced by external and internal factors economic social and technical all directly related and all affecting the mental and physical health of the individuals and groups within the enterprise. External factors in the post war period include the rapid rise of nationalism in a number of countries mass migrations industrialization the changing social structure rapid technical change brought about by mechanization and the beginnings of automation and sometimes leading to increased leisure and the altered ratio between clerical and service workers and workers on the factory floor. Alcoholism is a factor in some countries related sometimes but not always to the rise in the standard of living sometimes to bad housing conditions. An

other is the concentration of industry causing a flight from the country to the large cities.

The size of the industrial enterprise is in itself a factor in the psycho-social environment. Small units present fewer problems than large because the personal relationship between management and workers tends to be closer the group is more homogeneous and there is more understanding of the aims and possibilities of the business.

Within the enterprise the organization of the factory and the management's understanding of the human factor (which will govern the formal and informal relationship between it and the trade unions) the participation of the worker in the choice of the work he has to do the pace set in the work and the grasp of the need for technical change will all influence the psycho-social climate. The industrial medical officer's recognition of these factors will contribute to his ability to give advice that will be listened to and so influence the psycho-social environment for the better. He must however confine his advice to questions within his competence.

The industrial medical officer's role

The physical surroundings in which the individual works greatly influence him and the industrial medical officer must therefore pay attention to such points as cleanliness lighting colour and ventilation as well as to the raw materials and machines in use. A proper understanding of the influence of these material conditions on the worker requires an analysis of each person's work in relation to his aptitude and state of health. The doctor should carry out such an analysis if possible and should certainly be a member of any team that does job analysis so as to advise on the physical and mental environment as it reflects the health of the worker. He should be able to help in predicting the consequences of technical changes. These inevitably lead to social and often to economic changes and here he should make sure that the well-being of the individual worker is not sacrificed to the needs of production. These changes must also in the natural course of things arouse personal and group conflicts which will be

brought to his notice if he is trusted by all the employees and which he is well placed to see at an early stage. Because of his position and profession and trust in the confidential relationship between doctor and patient he can act as a channel of communication between groups and different levels in the organization. This may help ease difficult situations provided always that he reveals no source of information unless explicitly permitted to (or statutorily compelled to as in reporting disease).

If the doctor is trusted he is likely to find that he is asked for advice on subjects both inside and outside the factory. He cannot refuse to give this but he must be careful not to upset relationships between the person asking him for advice and his family, general practitioner or hospital consultant outside the works or personal or group relations inside it. The number of persons asking him for advice and the type of advice asked for can often be regarded as a measure of the workers' confidence in the doctor and can help reassure him that his task is being satisfactorily fulfilled. His advice will necessarily be limited by his training and experience.

Too much insistence on clinical examinations whether before a person is employed or periodically during his employment or before he is placed in a specific job may prevent the industrial medical officer from carrying out his other duties in such a way as to be of the greatest possible assistance to individuals, groups and the enterprise as a whole.

The Conference discussed the need for the industrial physician to be professionally independent. One view was that it is difficult to guarantee this if the doctor's salary is paid by the employer or by a trades union. Another was that a doctor whose professional ethical standards are high is not swayed or prevented from expressing his opinions which ever side of industry pays him. The view was also expressed that the doctor paid by industry itself is more integrated into the life of that industry and so more able to influence the management's outlook and protect the health of both managerial and other employee groups. The history, customs and opinions

of each country naturally count for a great deal in any question of how the doctor should be paid.

The Conference stressed the point that the industrial doctor should be capable of giving advice in terms understandable by if not always acceptable to any particular group in the enterprise. He must always express his opinion because the doctor working in industry is regarded as the social conscience of the enterprise and silence or failure to comment on mistakes will be interpreted as acquiescence in the action taken. He must be aware of and share in discussions about all matters pertaining to the maintenance and improvement of the psycho-social environment. This he will do with the management particularly as a colleague of the personnel manager but he will also take due care to see that the workers and their representatives know about the work and responsibilities of a health service and are given an opportunity to share in them.

Dealing with psycho-social problems

Statutory legislation usually meets only the minimum needs in the psycho-social field ensuring that the physical environment of the worker is not harmful to his physical and by extension his mental health. In many countries too bodies of workers and managers are set up by law to examine problems in the relationships between management and workers, problems that necessarily affect the psycho-social climate. An important part in maintaining and improving this climate is played by social security schemes many of which are embodied in legislative provisions and some of which are supplemented by voluntary schemes set up by employers, trades unions or both. Social security schemes should be encouraged by the industrial medical officer and if there is none in the enterprise in which he works he should try to persuade employers and workers to introduce one. The Conference agreed that the doctor should have nothing to do with payments to persons or groups of persons under these schemes; he is an adviser only and must take the utmost care neither to prejudice the

workers' rights to payment while ill or injured nor to set himself up as the judge of a worker's state of health when the worker is being looked after by his family physician or other doctor.

The psychological assistance that an industrial doctor gives to individuals or to groups is another way in which he influences the psycho-social environment. This is not to say that he must necessarily have had special psychological or psychiatric training though this would be of assistance to him. The studies he followed during his medical training should make him alive to human problems in their widest aspects and enable him at least to give emotional first aid and perceive signs of psychological disturbance either in individuals or in groups. Much of this kind of assistance has been and is being given by experienced industrial physicians without their being expressly aware of it as a contribution to the improvement of the psycho-social environment. Collaboration with management and workers to discuss such questions as sickness absenteeism and morbidity rates whether done in one enterprise regionally or even nationally will profoundly influence the outlook of the managers and workers and also have a great educational effect on the doctors taking part. The Conference recognized that in eastern European countries the duty and responsibility of detecting and dealing with these problems are in several hands not just in the hands of the industrial medical officer.

The doctor forms part of a team in all work affecting the psycho-social environment. The task of the personnel manager in this team deserves special emphasis: he should watch the psycho-social environment with particular care and would be much assisted in giving individual and group counsel by training in psychology and psychological methods.

Training in occupational health

While in most countries there is an increasing demand for doctors to do occupational health work in many there is a serious lack of qualified persons particularly of persons trained to understand the demands made by

the rapidly changing psycho-social environment. Some countries have no comprehensive and systematic training facilities at all for health work in industry especially in the psycho-social field. The Conference agreed that all doctors in the course of their training should at least be given some awareness of the health problems of industry they might then be assisted in the choice of their medical career and there might be an adequate supply of suitable candidates. The creation of institutes of occupational health would help in the training of doctors already in industry since the subject is evolving so rapidly that it seems difficult—the Conference thought—to leave training in the hands of medical schools steeped in a tradition that apparently excludes consideration of the problems now facing industry. Such institutes might be set up nationally with the aid and active collaboration of employers and trades unions. As well as giving training to doctors already in industry each institute would provide background training to those entering the field attempt to forecast the number of doctors required in years to come act as an advisory centre furnish a place of instruction and meeting and organize refresher courses to keep doctors up to date with advances in occupational health. Clearly it would also have a department of industrial psychology and have available skilled psychiatrists who would instruct industrial medical officers in the problems of industrial psychology and the psycho-social environment. And it would undertake research into occupational health a field in which a great deal remains to be done. Possible subjects of research are the psycho-social environment in small industrial units and the satisfaction to be got by the worker from belonging to adapting himself to and taking responsibility in a group of workers.

The Conference ended by expressing the unanimous opinion that knowledge of occupational health and of the problems of the psycho-social environment in industry should be given international diffusion. The work of ILO and WHO in this field should be expanded in collaboration where feasible with other international and national bodies.

TUBERCULOSIS RISK TO FAMILY CONTACTS

In developed countries with adequate hospital accommodation drug treatment of tuberculosis has often freed beds. In less developed countries with inadequate hospital accommodation the problem of beds for tuberculous patients remains acute. In India for example it is particularly serious since there are only 23 000 beds for tuberculous patients against a total number of persons affected that may be put at between 1.5 and 2.5 millions. Because of this a comparative study of domiciliary and sanatorium treatment of tuberculosis was undertaken by the Tuberculosis Chemotherapy Centre, Madras, which was set up in 1956 under the joint auspices of WHO, the Indian Council of Medical Research, the Madras Government and the Medical Research Council of Great Britain. The purpose of the study was to determine whether drug treatment of tuberculosis in a country like India was as effective in the home as in the sanatorium or to put it differently whether domiciliary treatment did away with the need to send a fair number of tuberculous patients to hospital.

A group of 193 patients were selected, most of them from the poorest classes of Madras City. They had to be more than 12 years old to have had no previous drug treatment and to have a positive sputum. Out of these 193 patients 96 were treated at home, 97 in the sanatorium. The period of comparison lasted a year and the results of the study summarized in a previous Chronicle¹ indicated that domiciliary treatment seemed to give as good results as sanatorium treatment. However, even if this problem is regarded as solved, there remains the very important point whether the risk of infection to the family is not greater when the patient is treated at home. A fresh study was carried out under WHO auspices on the same group of patients with the aim of determining the overall prevalence of cases of tuberculosis among family contacts when the diagnosis

of tuberculosis was established in the family member included in the comparative study (the index case) and the number of fresh clinical and primary cases occurring among family contacts during the first year of his treatment. Contacts include all the other members of the family but the inquiry was limited to close family contacts, i.e. those who had been living with the index case for at least three months before the diagnosis. In actual fact 96.7% of the 693 close family contacts had been living with the index case for at least a year.

When the index case started treatment contacts were given an examination that included a chest X-ray and a Mantoux test and were re-examined in the same way every three months for a year. Any contact who had an abnormal chest X-ray was given a full clinical and bacteriological examination, X-rayed again and if necessary submitted to more Mantoux tests. As well as this, contacts were visited at home by doctors and health visitors, whether the index case was being treated at home or in the sanatorium. When chest X-ray examination showed abnormalities during the year, the sputum or laryngeal swabs were cultured. If the Mantoux test became positive, a chest X-ray was taken six weeks later. Generally when a fresh case of tuberculosis was discovered, drug treatment was not started until bacteriological confirmation of the disease had been obtained, but an exception was made for young children and when the lesions shown in the X-ray were progressing rapidly.

Examinations were carried out in 693 contacts of the 193 patients treated at home or in the sanatorium; of these 347 were men and 346 women. The survey of the prevalence of tuberculosis when the index case started treatment was based on 672 contacts. Active tuberculosis was found in 46, in another 2 activity was doubtful and in 11 tuberculosis was inactive.

Of the 46 cases of active tuberculosis, 27 were classified as adult type, 19 as primary

or post primary in type. The Mantoux test was carried out on 647 contacts and 90% of those between the ages of 15 and 24 had indurations of more than 5 mm. It may be assumed that all contacts in these age groups had had their primary infections.

Of still more interest was the inquiry into fresh cases of tuberculosis appearing in close family contacts of patients treated either at home or in the sanatorium during the first year of treatment. There were 257 contacts of the 75 patients treated at home and 275 contacts of the 73 patients in the sanatorium. The families in which an infectious case other than the index case was discovered had been excluded from the inquiry. The two groups were alike in the proportion of men to women, in the kind of home they lived in and in the results of the initial examination and they were followed up in the same way during the year of the inquiry. During this year 26 cases of active tuberculosis were discovered in the two groups of contacts: 9 (3.5%) in the group of contacts of patients treated at home and 17 (6.2%) in the group of contacts of patients treated in the sanatorium.

Of these 26 cases 15 were under 5 years old and 21 under 10 years old. The most serious cases all belonged to the group whose index cases were treated in the sanatorium.

In 17 cases discovered in the first 3 months infection by the index case had probably occurred before treatment started for among them were 5 Mantoux negative cases belonging to the group of contacts of patients treated in the sanatorium and therefore

separated straight away from the index case. In the last 6 months of the study only 4 fresh cases of active tuberculosis were discovered in contacts of patients treated at home. It is difficult however to say whether infection came from the index cases earlier in the year of treatment or from a source outside the home.

Seven deaths occurred among contacts of patients treated at home but all were in children less than 3 years old and were due to other illnesses than tuberculosis. There were 3 deaths: 2 due to tuberculosis among contacts of patients treated in the sanatorium.

Serial Mantoux tests during the year showed that primary infections were no more common in the group of contacts of patients treated at home than in the other.

Even if encouraging conclusions can be drawn from this study domiciliary treatment of the open tuberculous patients should be considered as an emergency measure only to be taken when institutional treatment for 3-6 months is impossible because of a shortage of beds. Every effort should be made not to send patients home until their sputum has become negative for tubercle bacilli at least on microscopical examination.

A final conclusion is that the frequency and seriousness of tuberculous lesions in young contacts are a sufficient justification for systematic prophylactic treatment of children whenever a sputum positive patient is newly diagnosed in their household. This treatment should be started immediately and carried out for a minimum period of 6 months.

Reports of Expert Groups

The hygiene of milk and its products *

Problems of milk contamination whether by micro organisms radiation insecticides or antibiotics are under constant study by responsible national authorities and the international organizations concerned. A recently published report of the Joint FAO/WHO Expert Committee on Milk Hygiene¹ provides up to date information on various aspects of the sanitary production of fluid milk and also gives special attention to the hygiene of various milk products (butter cheese ice cream etc.) and to the problems involved in producing safe milk and allied products in warm countries.

Sources of contamination

Diseases transmitted through milk were dealt with in detail in the Joint Committee's first report. Of these staphylococcal enterotoxin poisoning is being recognized with increasing frequency. The improper and indiscriminate use of antibiotics by intramammary infusion for the treatment of mastitis has resulted in the production of antibiotic resistant staphylococci. Fortunately adequate heat treatment of milk effectively kills staphylococci but if they have been allowed to multiply in sufficient numbers and over a long enough period before processing the heat stable enterotoxin formed can cause serious outbreaks of food poisoning even from adequately pasteurized products such

as cheese and dried milk. This can be prevented by early cooling of all raw milk to 10 C or lower and by careful handling and proper refrigeration after processing. Streptococcal infections are of importance chiefly in countries where the milk industry is in an early stage of development and the same precautions should be taken. Tick borne encephalitis is now believed to be far more widespread than was previously thought. It appears to be associated more with goat's and sheep's milk than with cow's milk. Butter prepared from infected milk can maintain the virus for two months at 4 C. Research is required on the life span of the virus its inactivation (which appears to require different time temperatures from those of pasteurization procedures) and the possibilities of vaccinal protection of animals.

The feeling of the Committee was that the use of antibiotics for treatment of bovine mastitis should be more strictly regulated than it has been in the past and that milk from the animals concerned should be under more rigid control. Recent investigations on various types of "marker" for detecting the presence of antibiotics have suggested that dye preparations and chlorophyll are the most promising. Care must be taken however that such markers are non-toxic do not affect the activity of the antibiotic and are readily detectable in minute amounts uniformly dispersible in milk. The role of insecticides and herbicides in dairying demands urgent study since organo phosphorus compounds about the possible effects of which little is known are now being employed as systemic insecticides. The appearance of radio nucleides in milk after environmental contamination has aroused even greater public concern and is receiving attention from national and international authorities such as the International Dairy

Joint FAO/WHO Expert Committee on Milk Hygiene (1960) *Report of the Joint FAO/WHO Expert Committee on Milk Hygiene* (No. 197) G. N. A. 55 p. Geneva, 1960. Sw. fr. 2.— Also published in French, English and Spanish.

Members of the Committee: Prof. S. A. Im. Italy; D. F. W. Barber, USA (Chairman); D. T. E. Gal, India; N. H. I. D. C. K. John, C. S. (Representative); P. Fessler, P. I. D. C. K. John, C. S. (Representative); D. Y. Lebedev, USSR (Joint Secretary); U. T. E. C. F. A. M. R. L. Cooper, Secretary; Dr. M. Abdulsalam, WHO; M. R. N. C. K. WHO (Joint Secretary); D. M. M. Kapi, WHO (Joint Secretary); Dr. H. A. P. I. D. C. K. John, C. S. (Representative); Dr. H. A. P. I. D. C. K. John, C. S. (Representative).

World Health Organization, Geneva, 1957. 124

Federation WHO FAO and the United Nations Scientific Committee on the Effects of Atomic Radiation Of particular interest both economically and in reducing the hazards to human health are the research efforts under way to discover means of decontaminating milk

Safe milk products

The Committee took up the question of the hygienic control of milk products such as butter cheese ice-cream and dried and fermented milks In general the infections transmitted through such products are the same as those spread through fluid milk and their epidemiology and control were described in the Joint Committee's first report Certain infections may however be introduced during processing and handling while long storage at low temperature of such products as ice-cream and butter is ideal for the preservation of pathogenic micro-organisms *Mycobacterium tuberculosis* *Brucella* and the staphylococcus have been detected in butter after long periods and *Salmonella* is likely to be found in the additional constituents of ice-cream Several varieties of cheese are prepared from unpasteurized milk and hence are subject to the same risks as those noted above the so-called cheese poisoning observed in warm weather countries is thought to be caused principally by staphylococcal enterotoxin formed in unfermented cheese The lactic acid in fermented milk may have some inhibitory effect on *S typhi* and other *Salmonella* and *Shigella* but organisms such as *Mycobacterium* are not destroyed Little is known however about the survival of pathogens in such milk or in products such as khoa (concentrated milk) ghee and other butter fats Research on these aspects should utilize the advanced bacteriological techniques now available

The most important step in preventing the spread of infections through milk products is their control in the original milk For dried milk (a food of great value to developing countries) the milk should be heat treated at temperatures at least as high as for

pasteurization and subsequently protected from recontamination as well as contact with materials liable to bring about catalytically a deterioration of the lipid compounds Reconstitution presents further risks the water used must be bacteriologically safe and free as far as possible from mineral salts equipment and utensils should be scrupulously clean the procedures should be carried out accurately by healthy and experienced workers and the product should be consumed with as little delay as possible

Pasteurization of milk to be used for cheese is also very desirable cheeses made from raw milk should invariably use milk from herd free from tuberculosis and *Brucella* infections The growth of lactic acid bacteria essential for the inhibition of micro-organisms and for the production of cheese of good quality should not be suppressed by the presence of antibiotics bacteriophages or nisin producing bacteria The supply to cheese makers of efficient cultures and of uncontaminated high-quality rennet is therefore important

In butter making every care should be taken to prevent contamination of cream during cooling churning and eventual ripening by using easily sanitized churns and other equipment clean water of low bacterial content for washing the butter granules and automatic packing machines butter made in a creamery should be regularly examined for its bacteriological content

The manufacture of butter-oil and ghee entails heating to temperatures amply sufficient to destroy all pathogenic organisms—hence problems of hygiene arise chiefly through subsequent contamination or the addition of adulterants such as animal or vegetable fats Stringent control of these processes is therefore recommended and freedom from adulteration should be ensured

The preparation of ice-cream presents yet more opportunities for the transmission of infection and in more advanced countries its production and handling are controlled by standards and regulations The many varieties of both dairy and non-dairy foods used in its manufacture involve various risks and they must therefore be of the highest quality

Reports of Expert Groups

The hygiene of milk and its products *

Problems of milk contamination whether by micro organisms radiation insecticides or antibiotics are under constant study by responsible national authorities and the international organizations concerned. A recently published report of the Joint FAO/WHO Expert Committee on Milk Hygiene¹ provides up to date information on various aspects of the sanitary production of fluid milk and also gives special attention to the hygiene of various milk products (butter cheese ice cream etc) and to the problems involved in producing safe milk and allied products in warm countries.

Sources of contamination

Diseases transmitted through milk were dealt with in detail in the Joint Committee's first report. Of these staphylococcal enterotoxin poisoning is being recognized with increasing frequency. The improper and indiscriminate use of antibiotics by intramammary infusion for the treatment of mastitis has resulted in the production of antibiotic-resistant staphylococci. Fortunately adequate heat treatment of milk effectively kills staphylococci, but if they have been allowed to multiply in sufficient numbers and over a long enough period before processing the heat-stable enterotoxin formed can cause serious outbreaks of food poisoning even from adequately pasteurized products such

as cheese and dried milk. This can be prevented by early cooling of all raw milk to 10 C or lower and by careful handling and proper refrigeration after processing. Streptococcal infections are of importance chiefly in countries where the milk industry is in an early stage of development and the same precautions should be taken. Tick borne encephalitis is now believed to be far more widespread than was previously thought. It appears to be associated more with goat's and sheep's milk than with cow's milk. Butter prepared from infected milk can maintain the virus for two months at 4 C. Research is required on the life span of the virus, its inactivation (which appears to require different time temperatures from those of pasteurization procedures) and the possibilities of vaccinal protection of animals.

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P dersen, FAO (Jo t Sec t ry)

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Classification of pharmaceutical preparations

Some pharmaceutical preparations are toxic and if used without medical surveillance are dangerous some are inflammable corrosive or even explosive Limits must therefore be placed on their circulation Each country needs to make regulations for the protection of the population against accidents that might arise from unrestricted trade in these products

For this purpose the pharmaceutical preparations already on the market as well as those being introduced at an ever increasing rate must be classified Even a few years ago such a classification was relatively easy to make During the last twenty years however hundreds of new preparations—sulphonamides antibiotics addiction-producing drugs and hormone products—have been appearing causing difficulties in international trade since in certain countries some of them—both patent medicines and official products—may be sold freely whereas in others they are sold under stringent control

In 1958 the International Pharmaceutical Federation expressed the wish that WHO would be able as suggested by a study group of WHO set up to examine the use of specifications for pharmaceutical preparations *to undertake a study with the object of obtaining uniformity in the principles of classification of toxic substances used in therapeutics in different countries* In particular it would be advantageous to study the possibility of establishing a list of toxic substances used in therapeutics in respect of which proposals on labelling and supply to the public might be made to the governments of the different countries

An analysis of the legislation of fourteen countries on the classification of pharmaceutical preparations has just been published in the *International Digest of Health Legislation*

The regulations of the countries studied show no uniformity This is a reflection of their basically different approaches to the classification of pharmaceutical preparations There is however a common element in most texts some preparations can be supplied only on medical prescription many only by a pharmacist Other factors that may influence classification systems and give rise to marked divergences in the regulations are the rules about renewal of prescriptions keeping of pharmaceutical preparations by pharmacists the maximum amounts that pharmacists can supply without prescription and especially labelling requirements for these preparations A system of classification may also take into account that trade in pharmaceutical preparations is not always restricted to pharmacists In some countries they may be sold by other classes of traders in France however the pharmacist has a practical monopoly of this trade

Classification systems also differ because groups of pharmaceutical preparations are omitted from general regulations In some countries general regulations cover preparations for non medical uses vaccines and sera addiction-producing drugs or antibiotics in others these substances are the subject of special regulations In the United Kingdom for example vaccines and sera are covered by a special regulation and so remain outside the general legal provisions on pharmaceutical preparations and the classification adopted therein

The survey published in the *Digest* covers legislation in the following countries Belgium Canada Chile Dominican Republic Ecuador France Federal Republic of Germany India Israel Norway Portugal Switzerland United Kingdom and USA

See *J. D. H. A. Leg.* 1960 11 5 This study has also been published as an off. (price 3 6 \$0 60 Sw. f. 2.—)

with respect to their physical chemical and bacteriological condition. Pasteurization of the mixed ingredients must be more severe than for milk and every sanitary precaution must be taken both before and after heat treatment and freezing. Bacteriological analyses should be made frequently of all ingredients and daily of the mix and frozen products. The health and proper instruction and supervision of personnel are of especial importance particularly in connexion with the newer soft serve products which are frozen and dispensed without further hardening and demand a very high level of sanitary practice for hygienic safety.

Cream should be prepared only from milk of the highest quality preferably by centrifugal separator and at a temperature above 15°C. Its higher fat content requires a more drastic heat treatment than milk in pasteurization; sanitary equipment and distribution are again of the utmost importance.

Fermented milks are a speciality of certain central and southern European and Asian countries. Annexed to the report is a useful description of many lesser known milk products consumed in these areas. The souring process while reducing the danger of disease does not always render a product safe. Similar precautions to those recommended for fluid milk are therefore desirable; this applies also to flavoured milks and to evaporated or condensed milk.

Water used in dairying should invariably reach the standard of drinking water and should also be of a quality appropriate to its purpose—i.e. for cleansing it should be non-corrosive and free of materials that might react unfavourably with chemical or detergent agents or leave objectionable residues on equipment for cooling or heating. It should likewise be neither strongly corrosive nor strongly encrusting while for such processes as reconstitution of dried milk or butter washing it should of course be very carefully examined and if necessary treated

Milk hygiene in warm countries

Many of the warm weather countries are also those where poverty and protein malnutrition are common while at the same time the population is rapidly expanding. It is generally considered that permanent improvement of child nutrition in those countries is dependent on increased and improved local production of milk. A reasonably satisfactory milk can in fact be produced if the simple principles followed in other countries during their early stages of development are adapted to the local conditions prevailing in these less developed areas.

A limiting factor for dairy development is lack of properly trained personnel. Livestock improvement and increased efficiency of milk production and distribution are also needed. Preservation of milk in warm climates presents a great problem; the use of hydrogen peroxide for this purpose is countenanced only as a necessary evil since it is felt that it may eventually lead to neglect of hygiene.

Buffalo milk is becoming increasingly popular in countries where the animal thrives and further research on its content and the problems of hygiene it presents would be well repaid. The consumption of liquid sheep and goat milk and of cheese and butter made from unheated raw milk is considered to be one of the major causes of severe brucellosis in man in Mediterranean, South American and Asian countries and should be severely condemned. The control and eradication of zoonoses should be fostered. Simple education on such milking practices as the use of small mobile wooden platforms and milking from the side rather than the back would do much to decrease the risk of contamination. FAO plans to convene a meeting in the course of 1960 that will be concerned principally with sheep and goat milk problems and improvement of relevant breeding and husbandry practices in the Mediterranean area.

culin positive individuals will therefore be of great interest

But even if prophylactic treatment were confined to tuberculin positive individuals a programme of prophylaxis would be a tremendous undertaking in the USA alone for example there are 50 million tuberculin positive individuals who would have to be treated with isoniazid for the rest of their lives. This being so the really important question is whether after a year's treatment, fewer cases of tuberculosis will appear among the tuberculin positive individuals who have received isoniazid. If fewer do the drug will be of the greatest value not only for its effect on those who have been infected but also because indirectly it will reduce the risk of infection among those who have not.

Limitations of the film in health education*

Control of communicable diseases is a serious health problem in Peru and especially in the Andean region because of the people's unhygienic habits. In connexion with a programme for the control of tuberculosis and the prevention of intestinal parasitoses in Vicos—a small rural Andean community in the province of Carhuas—it was decided to evaluate the population's response to audio visual education by showing some of them a film.

The people of Vicos retain many of the characteristics of the indigenous inhabitants under the Inca Empire in ethnic composition, language, traditions, customs and social organization.

They speak the Quechuan dialect and live by agriculture and cattle raising. Most of them are sparsely scattered over an area of more than 7000 hectares. They are full of superstitions which determine their attitude to disease, medicine and doctors. They live crowded together with their animals in dwellings of mud, gravel and straw. For bedding they use the skins of goats and sheep and to protect themselves against the cold they wear cloaks (*ponchos*) and shawls made of coarse woollen mixture material. The community lacks safe drinking water and has no drainage system.

About 60 inhabitants of Vicos were shown a film on the louse and its role as a vector of exanthematic typhus (which occurs frequently in the Peruvian sierra) and on ways of preventing the disease. The film was presented in a simple manner in the people's own tongue and at the end questions were put to members of the audience.

Subsequently a survey was made to discover how far the people had understood the film, their attitude to it, and the effect it had had on their habits. In all 27 persons were interviewed (9 men, 11 women and 7 children) by means of a questionnaire.

In the commentary on the film, the word *taba d'lo* was used to mean exanthematic typhus but the inhabitants thought it referred to another disease caused, they said, by the heat. Consequently no one thought of the louse as the causative agent or vector or realized that *taba d'lo* was communicable or related it in any way to what they had seen in the film. They seemed to have felt some revulsion at the sight of the parasite and the infested persons but they did not connect them with the disease. They remembered especially the domestic scenes and in particular those which had shocked them, i.e. those showing the lice and infested persons. Not one of them had any conception of the film as a whole: they saw it as a succession of independent scenes. None of those questioned recognized the disease in the film as one that existed in the community. They were asked if they knew who had presented the film or appeared in it. Some supposed that it was the doctors; most of them did not know and only two mentioned the health education consultant.

The authors draw the practical conclusion that too much reliance should not be placed on films in health education of the public. By themselves they will not necessarily change people's habits and attitudes and they are of value mainly as an auxiliary medium to supplement active teaching.

Research on Chagas disease

A group of experts from Argentina, Brazil, Chile, Mexico, Peru, Venezuela and the United States has recommended to the Pan American Sanitary Bureau (PASB) which acts as the WHO

* Summary for article by Diaz Liza, Ponce de Leon, Cuba & Abner Montalvo (Bol. Of. san. panamer. 1959 47: 510).

Isoniazid in the prophylaxis of tuberculosis

The antituberculous properties of isoniazid its low toxicity ease of administration and cheapness have since its introduction aroused interest in its possibilities in the prophylaxis of tuberculosis. Experiments in animals have shown that it can prevent them from contracting tuberculosis after challenge doses of bacilli have been administered to them and the results achieved have stimulated inquiry into its effectiveness in man. In a recent number of the *Boletín de la Oficina Sanitaria Panamericana*¹ J. Murray of the US Public Health Service describes a study of its effects on human beings carried out in co-operation with several paediatric clinics in the USA, Mexico, Puerto Rico and Canada.

Isoniazid was administered to children with asymptomatic primary tuberculosis in the hope of preventing tuberculous meningitis and other serious complications. In all 2750 children were studied, divided randomly into two groups alike in age, sex, reaction to tuberculin and radiological findings. Each child in one group received daily doses of 4 to 6 mg of isoniazid per kg body weight for 12 months. In the other group the children received inert tablets. All the tablets were put up in bottles that could be identified only by conventional numbers so that neither the staff of the clinic nor the patients themselves knew who was receiving isoniazid and who inert tablets.

Once a month in the first year and once every three months in the second the children were carefully examined for early signs of complications. Of the 1394 children who received isoniazid only 2 had clearly marked complications and in 4 more the position was doubtful. Of the 1356 who received inert tablets 27 had clear complications and in 2 the position was doubtful. The difference in these figures is obviously of statistical significance.

Although because of its small cost and absence of side effects isoniazid could be given to all

tuberculin positive children the incidence of complications is so low that it would be preferable to treat only those who run the greatest risk. The risk increases with the degree of infection as shown by X rays and decreases with age.

Another interesting question is what happens to the children after a year's medication with isoniazid. The investigation included this period and it was found that complications occurred from the 12th to 24th months in 3 of the children who had received the drug as against 6 in the group that had received inert tablets.

These findings encouraged those taking part in the investigation to go further into the prophylactic possibilities of isoniazid and try to show whether it could prevent pulmonary tuberculosis. To begin with the study was confined to family contacts; they accepted treatment more readily, the scheme was cheaper because a system of examining contacts was already functioning and contacts were considered to run a greater than normal risk of being infected. Both tuberculin negative and tuberculin positive contacts were included and were divided into two equal groups, one of which was treated with isoniazid (in doses of between 3 and 6 mg per kg body weight) the other with inert tablets. As in the study of the children neither patients nor staff knew which contact belonged to which group.

Not enough time has elapsed for this inquiry to show results but even if isoniazid were to be shown to be completely effective in tuberculin negative individuals its value in the campaign against tuberculosis would be very limited according to Murray because these individuals run scarcely any risk of being infected in the infection rate at least in the USA being a rapidly decreasing one. It could however be used in given cases in which there was considerable exposure to infection. Studies in the USA and in Denmark (by the Danish Tuberculosis Index) have shown the high proportion of cases of tuberculosis that appear in tuberculin positive individuals and the probability is that this proportion will increase in the future. The results of prophylactic treatment in the group of tuber

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Knowledge in health education deals with the transmission and control of obvious effects of malaria. Specialists working in these areas are far

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nel fluoridation of drinking water and other mass preventive measures against caries improvement of dental health education the importance of research, uniform terminology and proper recording of results in the field of dental health undergraduate and post graduate training in child dentistry and orthodontics

It was agreed that the most important dental problem among European children is the prevalence of dental caries which ranges from 50% to 90% being highest in the countries of western Europe. Most of the children already have caries by the age of three sweet-eating being one of the chief causes. Much still remains to be done towards improving the condition of children's teeth in Europe and participants in the seminar agreed that closer collaboration between medical and dental services for children would be helpful. The participants undertook to inform the health authorities of their respective countries of the findings of the seminar.

Private donation to Malaria Eradication Special Account

Mrs I. Lenborg Madsen, a Danish lady living in Portugal, recently made a donation of 50 000 Danish kroner (about \$7250) to the WHO Malaria Eradication Special Account. In donating this sum, she asked for the money to be used for WHO projects in Africa.

Mrs Lenborg Madsen and her late husband lived for several years in Africa and themselves suffered from malaria. She has thus had the opportunity to appreciate the amount of human suffering and loss of life caused by the disease as well as the economic loss it can bring to whole populations and the obstacle it presents to their natural development.

WHO is deeply indebted to Mrs Lenborg Madsen for this generous donation which is one of the first examples of private support for the world wide malaria eradication programme.

People and Places

New Area Representative in India

Dr L. C. Eddey has been appointed WHO Area Representative in India. In this capacity he will advise the WHO Regional Director for South East Asia on the development of schemes for WHO assistance in India, co-operate with the national Ministry of Health in working out a co-ordinated WHO-assisted programme from year to year and co-ordinate the activities of the WHO workers in projects throughout the country.

Dr Eddey has had more than thirty years experience of public health work, having served as Director of Medical Services in British Guiana and as Director of Medical Services and later Chief Medical Officer to the Ministry of Health Gold Coast (now Ghana). He has led the United Kingdom delegations at various international health conferences. After joining WHO in 1955, Dr Eddey served for a time as a public health specialist in Nepal. For the past three years he has been a public health administrator on the staff of the WHO Regional Office for South East Asia in New Delhi.

Training of paramedical personnel

The subject of the technical discussions at the thirteenth session of the WHO Regional Committee for South East Asia, which will be held in Indonesia later this year, will be Evaluation of training programmes for paramedical personnel. The training and use of auxiliary personnel has become an urgent problem in all countries of the Region where the demand for health services is rising, particularly in rural areas and the supply of professional health workers is inadequate. To help in the preparations for these discussions, Dr N. R. E. Fendall is spending five months in the Region studying available information on the subject and visiting the various countries concerned.

Dr Fendall, who comes from New Zealand, is Assistant Director of Medical Services (Health) in Kenya and a member of the Overseas Civil Service of the United Kingdom. During his service in various parts of the Commonwealth, his main concern has been to bring the benefits of modern public health to the rural areas of developing countries; this has entailed a close study

Regional Office for the Americas that it sponsor studies on Chagas disease. Although about 35 million people in the Americas are exposed to this disease, some of the basic facts about it are still unknown.

The group recommended in particular research on the epidemiology of the disease, the ecology and susceptibility to insecticides of the reduviid bugs—known in the United States as kissing bugs—which spread it and on improved methods of prevention and treatment.

Chagas disease, which appears to exist only in the Americas, is found as far north as the United States and as far south as Argentina, principally in areas with low standards of housing and sanitation. PASB is now studying the experts' report to see how many of their recommendations can be implemented in the Bureau's programme.

Typhus in 1959

Louse-borne typhus cases were counted in millions after the First World War and in thousands after the second. In 1959, according to a recent number of the *WHO Weekly Epidemiological Record* (No. 13, 1960), the number of cases officially notified under the International Sanitary Regulations was only 5800. This represents a decrease of more than a thousand cases from the 1958 figure of 6960.

The biggest drop was in Ethiopia, which also had the largest number of cases in both years: 4749 in 1958 and 3694 in 1959. In the whole of Africa, there were 5700 cases in 1958 and 4900 in 1959.

In Africa, apart from Ethiopia, the cases were distributed as follows: 811 in the Province of Egypt (United Arab Republic), as compared with 789 in 1958; 79 in Cape Province, Union of South Africa; and sporadic cases in Algeria (26), Libya (17) and Tunisia (15).

In the Americas, the highest number of cases was recorded in Ecuador (283), followed by Mexico (258) and Peru (96). The presence of the disease was also notified in Colombia (12 cases), Chile (6) and Argentina (4).

In Asia (outside continental China), the disease was reported in South Korea (67 cases), Afghanistan (40) and Iran (15). In Turkey, 23 cases were notified.

In Europe, the louse-borne type of typhus was present in Yugoslavia (85 cases) and in Bulgaria (4).

Water development in Peru

In many parts of the world, increasing attention is being paid to the development of urban water supplies. Although any sizeable city should be able to plan, finance, manage and operate its own waterworks, very often some stimulus and advice on general planning are needed from an agency operating at the state or national level.

Peru has accordingly organized a National Board for Water Development, which will meet twice monthly to discuss and plan the water development of the country. In view of the conflict that often exists between competing interests in questions of water supply, the Board comprises representatives of the various agencies concerned with this problem and aims at co-ordinating their efforts.

WHO plans to provide travel grants that will enable the members of the Board to visit certain other countries and study other water administrations, so that they may be fully equipped to carry out their important and urgent task.

Dental services for children

The development and improvement of dental health services for children in the light of the different methods and resources of the countries of the European Region were discussed by a seminar held in Göteborg, Sweden, from 20 to 27 April 1960, by the WHO Regional Office for Europe. Forty-two dentists from 26 European countries took part.

Among the topics discussed were: canes prevent the number of hours a dentist can work per day in a children's dental health service; the number of children for whom he would be able to provide adequate care; the priorities in a dental health service in view of the shortage of dental personnel; the question of using auxiliary person-

Review of WHO Publications

MALARIA

Bulletin of the World Health Organization 1960
Volume 22, Number 6 (pages 601-766)

Five years have passed since the Eighth World Health Assembly accepted and sponsored the idea of global malaria eradication and the progress achieved during this period has been very satisfactory. Not research, but stimulating organizing and assisting world wide activities devoted to the eradication of this disease is now the primary aim of the World Health Organization in the field of malaria. Nevertheless the attention paid by the Organization to problems of malaria research has been steadily increasing during the past years. In spite of the satisfactory results of malaria eradication programmes there are still obstacles to overcome before the final goal is reached. Some of these are of an administrative, social or economic nature; others are technical. WHO seeks to deal with impediments of both types and the solution of technical difficulties depends on the amount of research devoted to malaria.

WHO attempts to fill in some gaps in knowledge of the fundamental aspects of malariaology and also to facilitate the technical application of the existing knowledge. This endeavour is carried out through the stimulation and material assistance of research projects undertaken by national institutes. The international collaborative work is maintained through the medium of expert committees, scientific groups or special training courses.

The national or international workers engaged on local malaria eradication programmes contribute an increasing flow of scientific data collected in the field. All these data are channelled, classified and recorded by WHO and constitute an important source of scientific information. Knowledge of new facts or achievements is disseminated as rapidly as possible in scientific publications.

This number of the Bulletin represents a cross section of research problems of importance not only to the progress of malaria eradication but

also to the furtherance of general knowledge in the fields of biology and public health.

The review by Sir Gordon Covell deals with the relationship between malaria parasitaemia and symptoms of the disease—a subject of obvious importance in the consolidation phase of malaria eradication and on which malariologists working in different epidemiological conditions are far from unanimous.

Alving and his colleagues give an account of the high sensitivity of the blood of some persons to 8 aminoquinolines—a defect which is inherited and due to a partially dominant sex linked gene. These authors indicate the way to practical solution of problems of radical treatment of malaria in countries where side-effects of 8 aminoquinolines might be relatively frequent.

Brewer and his co-workers describe a field method which permits easy identification of persons with high sensitivity to 8 aminoquinolines.¹ Lysenko provides a valuable review of the work on 8 aminoquinolines carried out with much success in the USSR and Fuhrmann describes a field test for the estimation of chloroquine in urine in programmes where supervision of mass administration of the drug is particularly important.

Yekutieli defines the new problems of epidemiology in terminal phases of malaria eradication and introduces some tentative criteria for operational aspects of malaria eradication programmes. He also describes new methods for the epidemiological assessment of the progress of malaria eradication.

A good example of international collaborative work is to be found in the paper by the WHO Division of Malaria Eradication and the Lister Institute of Preventive Medicine. Through the joint efforts of these two bodies more than 56 000 precipitin tests have been carried out on material from all parts of the world during the period 1955-59 with a view to investigating feeding preferences of malaria vectors. The results are summarized and discussed.

¹ A summary of this article appeared in *WHO Chronicle* 1960 14: 239.

of the training and use of health auxiliaries. In 1956-57 in furtherance of his studies he visited the USA, Puerto Rico, Central America and South Africa on a WHO fellowship.

Goutre in Pakistan and Lebanon

Dr Josip Matovinović has been appointed WHO consultant to the Governments of Pakistan and Lebanon for the planning—and possibly the launching—of a survey on the prevalence of goutre in these countries.

A graduate of the Medical Faculty of the University of Zagreb, Yugoslavia, Dr Matovinović is at present on the staff of the Radioisotope Unit, School of Medicine, University of Michigan, USA. He has made extensive studies of goutre in Yugoslavia.

Virological research in the United Arab Republic

Professor A. Smorodintsev of the USSR was appointed by the WHO Regional Office for the Eastern Mediterranean as consultant to the Agouza Laboratory, Cairo, Province of Egypt, United Arab Republic, at the beginning of April with the task of developing research on poliomyelitis and other virus diseases including influenza, smallpox and insect-borne infections of special concern to the United Arab Republic.

A Member of the USSR Academy of Medical Sciences, a holder of the Stalin Scientific Prize (First Class) and an Honorary Member of the New York Academy of Sciences and of the American Society of Bacteriology, Professor Smorodintsev has headed the Virological Department of the Institute of Experimental Medicine, Academy of Medical Sciences, USSR, for more than twenty years. He has played a leading part in the development and testing of a live poliomyelitis vaccine in the USSR and during his 6-week assignment in Cairo he helped national staff in their research on the poliomyelitis virus with a view to planning mass campaigns against the disease.

Yaws control in Thailand

A yaws control programme helped by WHO and UNICEF has been in operation in Thailand since 1950. The national field teams under the direction of Dr Somboon Vachrotai have recently been redeployed so as to concentrate on those

provinces where the prevalence of active yaws is still relatively high. The best way of integrating yaws control into the local health services is also being studied.

Dr Jean Grassioulet of France has been appointed second WHO medical officer to help with this stage of the programme. (The senior WHO medical officer is Dr J. de Vries, Netherlands, who has been working in Thailand since 1958.) Before joining WHO, Dr Grassioulet was Director of Public Health Services, French Guiana; he has also worked in the Public Health Service of Morocco on epidemiology, the control of communicable diseases and rural health in general.

The programme is also being helped by the newly formed WHO Treponematoses Advisory Team (see below).

Treponematoses Advisory Team

Many of the areas where there was formerly a high prevalence of yaws have now been covered by mass treatment surveys conducted with help from WHO and UNICEF. It is still however important to know where and to what extent the infection still persists in areas in which mass treatment is believed for practical purposes to have eliminated the disease, what is the true extent of the infection in areas of uncertain prevalence in which no campaign has so far been carried out, and what the future programmes for such areas should be.

WHO is accordingly forming Treponematoses Advisory Teams which will help health administrations to undertake selective surveys and conduct enquiries into the points just mentioned. The first of these teams is composed of a medical officer, Dr G. M. Antal of the German Federal Republic, who has previously worked in the Nigerian yaws programme, a nurse-administrator, Mr J. P. Maxwell of the United Kingdom, who has had many years' experience in yaws campaigns in West Africa and the Pacific islands, Mr P. C. Kaufmann of Switzerland, WHO headquarters statistician, and a laboratory technician, Mr J. F. D. Costa of India.

The Government of Thailand has requested the services of the team for a period of one year starting in May 1960, after which it will go on to evaluate some of the yaws control programmes in the Western Pacific Region.

biological foundations of prophylaxis which should be based on the study of the differences between the pathogenic species of amoeba and the discovery of a mass prophylactic drug that should possess a large number of properties difficult to combine. The author's list of subjects requiring study will be a stimulus to research workers.

Leptospirosis in the last few years has been shown to be more widely prevalent and biologically more complex than had been thought. Many parts of Latin America provide conditions favouring the development of leptospires and hence human infection and A D Alexander of the Walter Reed Army Institute of Research, Washington D C USA attempts an analysis of their distribution in some countries of South and Central America. Serotypes found elsewhere are found in them as well as other serotypes that appear to be new. To procure reliable data diagnosis must be by serological methods particularly by agglutination tests with multiple antigenic infections with several serotypes are common.

The classification of *B. ucella* has been the subject of much controversy for some years and several papers on it have appeared in the Bulletin. Phage typing coming after biochemical and serological methods has suddenly acquired considerable importance and joins the other recognized criteria of classification. Two notes deal with it. In the view of G C van Drimmelen of the University of Pretoria Union of South Africa phage lysis seems to offer promise of being a better criterion for species differentiation than monospecific agglutination. But phages are subject to mutations of a magnitude yet to be determined and their relationship to the virulence of the organism and to the epidemiology of brucellosis is still unknown. Lois M Jones of the University of Wisconsin Madison Wis USA

has compared the results obtained by phage typing and by the usual classification methods in a large number of strains of different origin. Finally M S Redfearn and D T Berman (also of the University of Wisconsin) give the results of typing by gel-diffusion which they consider can be substituted for agglutination with absorbed serum as the serological criterion for identification of unknown cultures of smooth *B. ucella*.

MENTAL HEALTH

Classification of Mental Disorders by E Stengel
(Offprint from *Bulletin of the World Health Organization* 1960 21 601-663) Price
3s 6d \$0.60 Sw fr —

Psychiatrists disagree about the concepts upon which a classification of mental disorders should be based hence the many classifications and the frequent description of the same or similar conditions under a confusing variety of names. The effect of this diversity of classification has been to defeat attempts at comparing psychiatric observations and the results of treatment in different countries or even in different centres of the same country.

In recent years the epidemiological approach to mental disorders has been more and more employed. To be used successfully and on a wide scale such an approach requires a common basic terminology and classification. As a first step towards this the author of this paper examines critically the classifications in current use. He shows that some of the difficulties created by present-day lack of knowledge are surmountable by the use of operational definitions and he outlines the basic principles on which he believes a generally acceptable international classification could be constructed.

The paper reproduces 38 different classifications in detail, and contains a useful reference list.

Muirhead Thomson critically examines the problem of changes in behaviour patterns of *Anopheles* vectors exposed to contact with residual insecticides and discusses the importance of behaviouristic avoidance.

Sacca & Guy report an observation on the changed behaviour pattern in *A. labranchiae* exposed to DDT deposits in a malaria programme in Morocco. Perry describes a number of biochemical studies carried out in the field in order to elucidate the mechanism of DDT resistance in certain *Anopheles* mosquitos.

Finally the laboratory experiments and field trials carried out by Hocking and his colleagues show that the residual action of BHC could be significantly extended by using a new formulation which decreases the sorption of insecticides by mud and other materials used in the construction of African dwellings.

COMMUNICABLE DISEASES

Bulletin of the World Health Organization 1960
Volume 23 Number 1 (pages 1-134)

During the past four years a series of studies on the laboratory diagnosis of various diseases—intended to help public health laboratories and research workers to select and to carry out diagnostic tests—has appeared in the Bulletin. This issue presents two such studies: one on *Pneumococcus* infections by Erna Lund of the Statens Seruminstitut, Copenhagen, Denmark; the other on whooping cough by H. Lautrop (also of the Statens Seruminstitut). These studies like their predecessors on plague, cholera, streptococcal and staphylococcal infections, *Shigella* and *Salmonella*, describe and discuss the collection of specimens, culture media and reagents and chemical and serological tests. In each there is a list of references to the principal studies on the subject.

One of the purposes of the field trials of typhoid vaccines carried out in Yugoslavia in 1954-55 was to compare the efficacy of vaccines prepared in different ways and to find a laboratory test in animals that would give results applicable in man. Three laboratories—in England, Yugoslavia, and the USA—were entrusted with the study of the various types of vaccine and A. F. B. Standfast

describes the results obtained at the Lister Institute of Preventive Medicine, Elstree, England, and compares them with those obtained in the other two laboratories.¹

In the autumn of 1949 poliomyelitis which had until then occurred only sporadically in Israel became epidemic and between 1950 and 1957 its incidence never fell below 2.3 per 10 000. In 1950 the attack rate was 12.8 per 10 000. Vaccination with the Salk vaccine was begun in 1957. In 1958 another epidemic occurred followed with great interest in all countries as it was the first time that an opportunity had arisen to assess the amount of protection conferred by vaccination on a population of young children exposed to a serious epidemic. A. M. Davies of the Hebrew University, Jerusalem, Israel, and his colleagues describe the situation over the past ten years, the organization of the vaccination campaigns and the results achieved in the epidemic. The vaccine conferred some degree of protection but less than might have been expected from experience elsewhere in older children.

In spite of failures to notify cases, defects in classification and divergences in terminology there can be no reasonable doubt that diarrhoeal diseases are still the leading cause of death in infants and young children in many countries of the world. Among the organisms responsible for these diseases are *Shigella*, *Salmonella*, *Escherichia coli* and certain viruses. N. K. Ordway of Yale University, USA, reviews the etiology of the various types of diarrhoea, notes that vaccination and chemoprophylaxis are ineffective and concludes that prevention depends largely upon improvement in environmental sanitation. Treatment and prevention require more trained personnel and the strengthening of the existing maternal and child health services and the development of new ones are of basic importance.²

Prophylactic measures against amoebic dysentery are needed in certain tropical and subtropical countries because of the prevalence of this disease. They are difficult, however, to organize at present, our knowledge of the disease being inadequate. I. de Cameris of the Carlo Erba Institute for Therapeutic Research, Milan, Italy, indicates the

¹ A summary of this article appeared in *WHO Chron.* 1960, 14, 26.

² This paper was mentioned in general articles on diarrhoeal diseases which appeared in *WHO Chron.* 1960, 14, 179.

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THIRTEENTH WORLD HEALTH ASSEMBLY—2

The July number of the Chronicle contained an account of the Thirteenth World Health Assembly and its main decisions. The article that follows is a summary of the Assembly's discussions on the reports of the Director-General.

The discussions on the Director General's report on the work of WHO during 1959¹ gave delegates to the Thirteenth World Health Assembly an opportunity to express the views of their governments on the Organization's policies and achievements and to report on public health developments in their respective countries. A comprehensive account of the discussions will be found in the verbatim record of the plenary meetings and the minutes of the committees and sub-committees.² The following is a summary of the main items of discussion.

Malaria eradication

In connexion with the Director General's report the delegates of a number of countries gave details of progress in malaria eradication.

The delegate of Afghanistan stated that malaria was the greatest public health problem in his country. The eradication campaign there had started 18 months earlier and more than 4 million persons were now protected in areas where malaria prevalence had been almost 75%.

The malaria eradication programme in Colombia is considered to be the most successful of the country's health activities. An agreement on the programme of the campaign was concluded with WHO in 1956 and spraying started in 1958. The fourth spraying cycle has just ended and it is hoped to finish the fifth cycle thus completing the first stage of eradication in March 1961. Eradication is expected to be achieved by 1967. Insecticide resistance has

developed in some localities among certain *Anopheles* but the question has been studied thoroughly by experts and it is hoped to overcome this difficulty. Evaluation of the campaign started with the end of the first spraying cycle and every care is being taken to ensure that it is as complete as possible. Technical staff for the Colombian campaign has been trained with WHO assistance and 25% of the national health budget is being devoted to the campaign. Agreements have been concluded with neighbouring countries—Venezuela, Peru, Ecuador and Panama—for joint eradication efforts aimed in particular at freeing the Pan American Highway from malaria hazards.

In Ghana a pilot project for the mass treatment of malaria—the country's chief cause of morbidity and mortality—with medicated salt has been planned. In India practically the whole population of 400 million is being protected by spraying and complete eradication of malaria is one of the aims of the country's third five year plan which starts next year. "The plan for [malaria] eradication" said the chief of the Indian delegation "will go down in history as one of the most fascinating endeavours on a global scale for the welfare of mankind." In Lebanon the consolidation phase of the malaria eradication campaign has apparently been reached.

A pre-eradication survey was started in the Republic of Korea last year; the team has detected one malaria focus and it is continuing its work in an attempt to detect others. Malaria is a major problem in the Federation of Malaya and an eradication pilot project is now being carried out in areas

¹ Off. Re. Wld Hlth Org. 1960 98.
² Off. R. Wld Hlth Org. 1960 103.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

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ment method was inadvisable except where advanced social welfare services were available

In Tunisia ambulatory treatment has produced satisfactory results only in the early stages of the disease hospitalization is in general preferred because patients are better fed and a large proportion of the Tunisian population is undernourished The findings of the Madras study were welcomed by the representative of Nigeria which as an economically less developed country is faced with the problem of a high tuberculosis incidence shortage of hospital beds and gross overcrowding There is never enough room in Nigerian hospitals for more than 25% of the cases detected and home treatment has on the whole proved more successful in Nigeria than not The main problem is the acute infective case because there is not enough room in the hospitals and the patient cannot be successfully isolated at home The delegates of Cuba the Republic of Korea and Viet Nam also spoke of hospitalization difficulties and the consequent advantages of domiciliary treatment The delegate of Ethiopia said that the incidence of tuberculosis was so high in his country that hospital treatment for every case would absorb not only the budget of the Ministry of Health but that of the whole Government

Case finding was also discussed The delegate of the Netherlands considered that in a country like his own with a very low tuberculosis morbidity and no general BCG vaccination programme X ray examination though it could not be dispensed with altogether was certainly not more important than case finding by tuberculin testing, particularly where young people were concerned In fact in the Netherlands children under 16 could not legally be submitted to mass X ray examination but were examined for tuberculosis by mass tuberculin testing The delegate of China (Taiwan) stressed the general usefulness of sputum investigation for mycobacteria this simple procedure had enabled much valuable information to be collected in his country In the opinion of the delegate of Iran tuberculin testing alone is not sufficient for diagnosis but

X ray examinations should be confined to those for whom the result of the test was positive The delegate of the Federal Republic of Germany said that the tuberculosis control programme there would in future be based on mass case finding by means of X ray examinations starting at the age of 15 the campaigns so far carried out show an extremely high incidence rate among the aged and future work would be directed towards that group

After referring to the antituberculosis campaign now in progress in Turkey with help from WHO and UNICEF the delegate of Turkey praised WHO's work in this field and in particular the studies started in 1958 to determine the type of freeze-dried BCG vaccine most suitable for use in unfavourable climatic conditions

Details on tuberculosis control activities were given by a number of delegates In Cuba for example some 200 000 X rays were taken in 1959 and approximately 500 000 would be taken in 1960 119 000 vaccinations were carried out in 1959 and 67 000 during the first quarter of 1960 In India tuberculosis is the most formidable health problem next to malaria what was perhaps the largest mass BCG campaign ever undertaken has been carried out there and is now in its maintenance stage Attempts are being made to stabilize antituberculosis work by establishing a network of well-equipped clinics while a National Tuberculosis Institute has been set up in Bangalore with WHO assistance

Once the first cause of death in Japan tuberculosis is now the sixth the delegate of Japan gave much of the credit for this to preventive measures employing BCG though chemotherapy has also played a part

In the tuberculosis control programme in Thailand 1 200 000 people have been tuberculin tested and 500 000 vaccinated a pilot project covering case finding chemotherapy and epidemiology has been undertaken in Bangkok Tuberculosis is the most important medico social problem in Tunisia During a campaign started with WHO and UNICEF help in 1959 90 000 people have been vaccinated with BCG and 350 000 examined by X ray in the areas so far covered by the

where infant mortality from the disease is high

In Mexico spraying has already stopped in certain areas where transmission is considered as interrupted. The delegate of Mexico stated that the results of the eradication campaign had been even better than expected. In the years 1949-1952 the annual average mortality due to malaria had amounted to 90 per 100 000 of the population and the disease was the country's third most frequent cause of death. By 1959 however the death rate had decreased to 9.7 per 100 000 while morbidity decreased between 1950 and 1959 from 244.1 per 100 000 to 4.3 per 100 000.

The eradication programme in Paraguay has been in full operation since the middle of 1957 and the third spraying cycle is now under way. 147 000 dwellings having been treated with dieldrin in the first cycle and 161 000 in the second. In Peru excellent results have been achieved by the campaign which started in 1957: the whole country has now been covered by spraying—the coastal area three times, the sierra twice and the forest once.

In the Philippines the incidence of malaria was reduced from an average of 19.08 per 1000 people at risk between 1953 and 1957 to 9.74 in 1958 and 6.80 in 1959. There has however been some resurgence of the disease because of dieldrin resistance and DDT is now being used. Mortality due to malaria in Thailand has been reduced from 35 000 to 9000 deaths a year.

The delegate of Venezuela stated that his country had the largest malaria free area of any in the tropics (400 000 km²): this was due to the country's own efforts and as a result of its experience in malaria work. Its malaria centre was one of several being used for the training of international staff for eradication programmes in other countries of the Americas.

Several countries reported the results of pre-eradication surveys and a number of delegates paid tribute to the help received from the US International Cooperation Administration (ICA) and UNICEF as well as from WHO in their eradication programmes.

Tuberculosis

The delegate of Denmark spoke of the possibility of eradicating tuberculosis at least in countries where its incidence was low and continuing to decline. He felt that there was still too much tendency to consider tuberculosis as a social disease related to bad living conditions rather than as an infectious disease which can provoke epidemics even where living conditions are good. In the past it had been very difficult to attack the disease directly but the means were now available. WHO was to be congratulated on its leadership and guidance in the public health approach to the problem through mass miniature radiography, extensive BCG vaccination, large scale treatment of early cases of tuberculosis, preventive treatment for population groups at special risk, etc.

Great interest was shown in the first results of the controlled comparison of sanatorium and domiciliary treatment of tuberculosis carried out at the Tuberculosis Chemotherapy Centre, Madras, India, under the auspices of the Government of India, WHO and the Medical Research Council of Great Britain. From this comparison it appeared that treatment at home gives results closely approaching those of treatment in a sanatorium. Speaking of the publicity given to this study the delegate of Belgium considered that the value of hospitalization for tuberculosis in countries with adequate facilities should not be played down in favour of domiciliary or ambulatory treatment which was intended principally for countries without enough beds for tuberculosis patients. This opinion was shared by the French delegation. The delegate of Israel stated that while there was no shortage of beds for tuberculosis patients in his country good results had been achieved there by domiciliary treatment centres attached to clinics, thus reducing the need for hospitalization. Nevertheless he considered that further trials were indicated before domiciliary treatment was used on a wide scale. This was also the opinion of the delegates of Iraq and Poland. The delegate of Ecuador considered that the home treat-

population surveys of the problem have been undertaken there and in Angola

French and Belgian delegates stressed the need for further research on onchocerciasis covering such aspects as the biology of the vectors the pathogenicity of the ocular lesions and treatment.

The delegates of China (Taiwan) and Malaya expressed the hope that WHO would give more attention to filariasis. The Indian health authorities are also much concerned with this disease and have embarked on control measures with help from ICA.

In his summing up of the discussions on communicable diseases by the Assembly's Committee on Programme and Budget, Dr P. M. Kaul, Assistant Director General of WHO, said that large scale campaigns against onchocerciasis and filariasis are not practicable for the Organization at the moment, since much more information on these diseases is needed for their effective control. WHO has however sponsored investigations to ascertain why onchocerciasis produces blindness in some cases and not in others and further research and field studies in connexion with the disease are included in the 1961 programme. During the discussions the WHO Regional Director for Africa announced that a second regional conference on onchocerciasis has been planned for 1961.

Smallpox

Transport difficulties were mentioned by several delegates as major obstacles to the achievement of certain smallpox eradication campaigns. While more than a million persons were vaccinated in Afghanistan last year the relative inaccessibility of many communities is hindering rapid coverage. A vaccination plan extending over five years has therefore been adopted. The launching of a smallpox eradication campaign in Ethiopia has been held up one of the reasons being the lack of a vaccine suitable for delivery to remote and hot areas without any proper transport facilities. In Indonesia there is a shortage of transport and cases of smallpox still occur in inaccessible parts of the country. The eradication campaign

planned by the Indonesian authorities has therefore been postponed for two or three years but it is hoped that with the help of an epidemiologist provided by WHO the disease will be controlled to such an extent during 1960 that a costly eradication campaign will be unnecessary. Approximately 600 cases a month are reported in the eastern part of what was formerly French West Africa here too operations are rendered difficult by poor communications.

The difficulty of preserving the potency of the vaccine lymph has been overcome in Nigeria by the use of dried vaccine. In the opinion of the representative of Nigeria it should be possible to eradicate smallpox in West Africa by the end of 1965 with this vaccine. He was convinced that if WHO would give some help all the governments in the area would co-operate. His Government would be able to supply the necessary dried vaccine if given sufficient time to expand production. The Government of Jordan is also prepared to help countries undertaking smallpox eradication by offering 2 million doses of vaccine each year for distribution by WHO.

A high degree of immunization against smallpox has been maintained in Cambodia through yearly mass vaccination campaigns in 13 provinces. An intensive vaccination programme with the aim of eradicating smallpox within three or four years has been undertaken in India the coverage for the current year being about 15 million. In Iran the eradication programme is well advanced mobile vaccination teams are starting on their second nation wide coverage. In Lebanon under a law promulgated in June 1959 vaccination against smallpox every four years has been made compulsory. The delegate of Mexico stated that eradication of the disease from his country has now been achieved. Eradication started in Paraguay in April 1958 and by February 1960 99% of the population had been vaccinated.

The fifth consecutive year without a smallpox case has now passed in Peru vaccination is compulsory and the vaccine is manufactured locally. In Viet Nam 5000 cases of smallpox were declared in 1954 in 1959 there were

programme there was a 4% prevalence of tuberculosis and half the cases required chemotherapy

The delegate of Afghanistan spoke of his country's successful tuberculosis control and treatment centre which also serves as a training centre. A preliminary survey in Libya is expected to be completed by the end of this year and country-wide tuberculosis control programmes will then be launched. In Viet Nam some tuberculosis dispensaries have been established and it is hoped to start a mass case finding programme shortly.

Tuberculosis is still a serious—and in some cases a growing—problem in certain African countries. It was practically unknown fifteen years ago in the territories comprising the Federation of Mali but is now on the increase there in Dakar for example 15% of children tested with tuberculin at 3 years of age were positive and 14% of deaths among children cared for by the city's paediatric service are due to tuberculosis. In the Republic of Upper Volta tuberculosis is a particularly serious problem but the means for combating it are practically nil. A systematic campaign against the disease is due to begin in the Republic of Niger this year though the financial problem of providing the necessary X-ray equipment has still to be solved.

The filariases

While welcoming the Director General's decision to include studies on onchocerciasis in WHO's programme the delegate of Guatemala considered that one or more permanent centres for research on the disease should be established in the Americas. Onchocerciasis was of great social and economic importance in Guatemala not only because of its incapacitating effects but also because it discouraged settlement in potentially fertile districts. Though great efforts had been made to control it the Guatemalan health authorities had only found it possible so far to reduce the prevalence of blindness among affected persons by the removal of onchocercal nodules but not to

reduce the incidence of infection in endemic zones or prevent the spread of the disease to new areas. It was interesting to note that, alongside the newly infected areas there were others where despite apparently identical climatic and entomological conditions no cases had been reported. There were in fact many unanswered questions concerning the epidemiology and pathology of the disease which called for concerted investigation. Experience in Africa as well as the pilot projects in Guatemala and Mexico had shown that while it was possible to achieve control or even eradication of the vectors this must be supplemented by the mass treatment of cases. His country could not afford to undertake such a programme alone and hoped for more assistance from UNICEF and WHO.

The United Kingdom delegate thought that onchocerciasis should be given greater priority in the work of WHO. While there had been some diminution of incidence in East Africa and the Belgian Congo it was spreading at an alarming rate in other parts of the world. Moreover its manifestations were widely varied. In some parts there were villages where it caused blindness in up to 60% or 70% of cases whereas in others there were no ocular symptoms whatsoever. In Aden for example manifestations of the disease never came more than halfway up the thigh although the causative agent appeared to be the same as in other places where the manifestations took an entirely different form.

The delegate of Venezuela also thought that investigations of onchocerciasis should be extended. The distribution of the disease in his own country was not yet fully known but foci had been found in 11 of the 20 provinces suggesting that it was widely disseminated.

Representatives of several African countries and territories spoke of the ravages of onchocerciasis. In the Federation of Mali up to 90% of the population in certain villages are affected. In some villages of the Republic of Upper Volta a third of the inhabitants are blind as a result of the disease. It is spreading widely in Sudan and has caused the desertion of whole areas by the

Bilharziasis

The delegate of Iraq said that bilharziasis was still a major problem in his country in spite of the different methods used no satisfactory results had yet been achieved in controlling the snails and interrupting transmission. With new irrigation projects there was an increased possibility that the disease might spread. This problem might be solved by environmental sanitation and health education but these were both long range programmes. The problem was very real for Iraq and other countries in the same region and he therefore hoped that research would be continued and more fellowships awarded in this field. Further research on bilharziasis was also urged by the delegates of the United Kingdom and Nigeria.

Representatives of two new African republics spoke of the bilharziasis problem in their countries. In the Federation of Mali the disease affects 15 1/2% of children between 1 and 4 years of age, 47 2/3% of children of school age and 25 5/6% of adults while in the Republic of Upper Volta more than 90% of the children in certain areas are infected.

Treponematoses

Successes in campaigns against the treponematoses were reported from a number of countries. The yaws campaign in Haiti is now in its concluding stages. Before 1947 the great majority of the country's rural population had been affected by the disease but no more than 400 acute cases were reported at the end of 1959. A survey covering 23% of the population has led to the discovery of new cases which are now being treated. A further survey during 1960 is expected to lead to the announcement that the disease has been eradicated from Haiti. In Nigeria the yaws campaign has reached the consolidation stage up to the end of 1959 some 18 000 000 examinations were carried out and some 6 500 000 people treated. The Nigerian yaws teams have been trained to search not only for yaws but also for leprosy, sleeping sickness, enlarged spleens, malnutrition and bilharziasis and to carry out smallpox vaccination.

In the Thailand yaws control programme 18 000 000 examinations have been made and 1 300 000 people given treatment for the disease. The authorities of Thailand wish to co-operate with the authorities of adjacent countries in preventing the spread of yaws in frontier regions.

A yaws campaign started in Cambodia in 1959 and in January 1960 another started in the Republic of the Congo where the disease is tending to develop in the forest regions. A mass campaign against the treponematoses started in the Federation of Mali at the beginning of this year. It is expected that by the end of the year every member of the population will have been examined twice.

The mass treatment of endemic non venereal syphilis has started in Iraq after a survey showed that more than half a million people in the country were affected. The delegate of Mexico announced that a campaign had been started in his country for the eradication of pinta, a treponematoses which is less aggressive than yaws but nevertheless affects some 300 000 of Mexico's rural inhabitants.

Polioviruses

The delegate of Belgium spoke of live poliovirus vaccination in the Belgian Congo where this method was used as long ago as 1957. Of 46 000 children under 5 years of age who had been vaccinated with type 1 virus 3400 had not had antibodies before vaccination. Tests carried out six months after vaccination had shown that 60% of them had acquired antibodies. This relatively disappointing result led to the conclusion that in some cases the vaccination had been inhibited by the presence in the intestinal tract at an early age of various types of enterovirus. It would therefore seem necessary to institute research to find out whether it would not be advisable in areas where hygienic conditions are still rudimentary to vaccinate children a few days after birth. It might also be advisable to conduct further research on the dissemination

only 12 and no new cases have been reported since April of that year

Leprosy

A representative of Cameroun stated that the leprosy situation in his country is fairly good 28 000 cases are being treated out of the 33 000 reported In the Central African Republic 65 000 persons or about 6% of the population are affected by leprosy, but the prevalence has started to decrease as the result of a campaign undertaken with UNICEF help It is hoped that the disease will cease to be a problem in the Republic by 1965

The leprosy campaign started with help from WHO and UNICEF in the territory of what is now the Republic of the Congo will be continued at least until 1962 The campaign has already yielded excellent results the number of arrested cases and cases under observation now considerably exceeds the number of new cases being reported The organization of leprosy control in Ghana has been improved and the results are a striking example to the public of what health campaigns can achieve

On 31 December 1959 there were 110 129 known cases of leprosy in the Federation of Mali Of these 16 773 were discovered during 1959 when 990 000 inhabitants were examined for the disease About 55 000 of these cases are being treated with sulfones by WHO and UNICEF teams In Mozambique 59 000 leprosy cases or 90% of the known cases are being treated In the Republic of the Niger a programme of leprosy control almost entirely by domiciliary administration of sulfones is being successfully pursued with WHO technical aid and UNICEF transport A WHO leprosy consultant visiting Portuguese Guinea has reported favourably on the measures being taken there against the disease of an estimated 20 000 cases 13 000 are now receiving treatment and a special leprosy service was recently established

The delegate of Argentina expressed satisfaction at the important place given to leprosy in the Director General's report the Argentine National Congress he said is

about to examine a series of new legal provisions to ensure more humane and scientific treatment for leprosy sufferers In Colombia too special legislation is being passed to abolish the segregation of leprosy patients

In the past very few cases of leprosy were reported in Guatemala so that the problem had never been taken up very seriously However since a leprosy section has been set up in the Communicable Diseases Division of the General Directorate of Health many unsuspected cases have come to light The delegate of Guatemala therefore suggested that it might be useful to set up leprosy sections in those countries where they do not already exist In Paraguay about 600 000 persons have been examined in a leprosy case finding campaign which revealed a prevalence of about 2 cases per 1000 inhabitants Treatment and control of patients and their families are being carried out by the health services and ambulatory treatment has been substituted for compulsory segregation in hospitals

The delegate of Afghanistan said that his Government was particularly concerned about the 2000 cases of leprosy in his country and hoped that it would be possible to undertake a survey of the problem with WHO help In India extensive measures for the control of leprosy are being taken under the Government's second five year plan There are at present 100 leprosy control units in those parts of the country where the disease is highly prevalent in addition to a large number of private institutions which have been in existence for many years 12 000 000 people have been examined for leprosy and 80 000 cases found among them A central institute for training and research in leprosy has been established Preliminary results with chemotherapy have led Indian health authorities to hope that it may be possible to prevent the spread of leprosy among children this would be a very important step forward in the control of the disease The delegate of India hoped that WHO would help to investigate the results of BCG vaccination for leprosy He also suggested that measures be studied for preventing the occurrence of leprosy deformities

Bilharziasis

The delegate of Iraq said that bilharziasis was still a major problem in his country. In spite of the different methods used no satisfactory results had yet been achieved in controlling the snails and interrupting transmission. With new irrigation projects there was an increased possibility that the disease might spread. This problem might be solved by environmental sanitation and health education but these were both long range programmes. The problem was very real for Iraq and other countries in the same region and he therefore hoped that research would be continued and more fellowships awarded in this field. Further research on bilharziasis was also urged by the delegates of the United Kingdom and Nigeria.

Representatives of two new African republics spoke of the bilharziasis problem in their countries. In the Federation of Mali the disease affects 15 1/4 of children between 1 and 4 years of age, 47 2/3 of children of school age and 25 5/8 of adults while in the Republic of Upper Volta more than 90% of the children in certain areas are infected.

Treponematoses

Successes in campaigns against the treponematoses were reported from a number of countries. The yaws campaign in Haiti is now in its concluding stages. Before 1947 the great majority of the country's rural population had been affected by the disease but no more than 300 acute cases were reported at the end of 1959. A survey covering 23% of the population has led to the discovery of new cases which are now being treated. A further survey during 1960 is expected to lead to the announcement that the disease has been eradicated from Haiti. In Nigeria the yaws campaign has reached the consolidation stage up to the end of 1959 some 18 000 000 examinations were carried out and some 6 500 000 people treated. The Nigerian yaws teams have been trained to search not only for yaws but also for leprosy, sleeping sickness, enlarged spleens, malnutrition and bilharziasis and to carry out smallpox vaccination.

In the Thailand yaws control programme³ 18 000 000 examinations have been made and 1 300 000 people given treatment for the disease. The authorities of Thailand wish to co-operate with the authorities of adjacent countries in preventing the spread of yaws in frontier regions.

A yaws campaign started in Cambodia in 1959 and in January 1960 another started in the Republic of the Congo where the disease is tending to develop in the forest regions. A mass campaign against the treponematoses started in the Federation of Mali at the beginning of this year it is expected that by the end of the year every member of the population will have been examined twice.

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³ See also article on p. 318

of the virus through the agency of those who have been vaccinated

Poliomyelitis is now one of the leading health problems in Mexico studies are going on there on both live and inactivated vaccines and it is hoped to make the findings available to PAHO (the Pan American Health Organization) and to WHO In Albania oral vaccination with the Sabin live vaccine is being given to all children this year The delegate of Iran stated that his country would sooner or later have to launch an immunization programme and from the administrative point of view it would be most practical and economical to use live vaccine administered orally He therefore hoped that WHO would pursue research on this subject

Although the use of inactivated vaccine in Israel in 1958 proved a partial failure the vaccine protected nearly 60% of the children concerned Since then steps have been taken to strengthen the type 1 component of the vaccine to ensure its adequate potency In 1959 only 36 cases of poliomyelitis occurred in Israel 25 of them in unvaccinated persons All children born in 1959 have been given full protection and field trials of live vaccine are in progress

Communicable eye diseases

The delegate of Tunisia gave details on the campaign against communicable eye diseases which started in the south of the country in 1954 and has since been extended progressively to the north This WHO assisted campaign comprises a school programme and a mass programme against seasonal conjunctivitis In 1959 the school programme was in operation in all the country's schools and 380 000 children were treated all school nursing staff have to take special training in the treatment of eye diseases The mass programme against seasonal epidemic conjunctivitis will reach 1 400 000 persons in 1960 and 1 900 000—more than half the population of Tunisia—in 1961 By 1963 the whole population should have been treated In connexion with the campaign the Tunisian Government has made ophthalmic ointment

available throughout the country at a fixed, reduced price

During 1959 a million persons were treated in the WHO assisted campaign against communicable eye diseases in Morocco The delegate of Libya said that trachoma was one of the principal health problems in his country and that it was hoped to organize country wide control projects with the help of WHO It is hoped to start a similar control programme this year in Iraq where some 400 000 persons are estimated to be suffering from trachoma

During discussions on work in the regions the WHO Regional Director for the Western Pacific stated that an evaluation and research pilot project has been planned in connexion with the WHO assisted mass trachoma campaign in China (Taiwan) It is hoped that the results of the study will be of value not only to Taiwan but to other countries and regions where trachoma is still a problem

Atomic energy and radiation

The delegates of a number of countries called attention to the hazards presented to the health of the world by tests of atomic weapons and expressed the hope that some thing would be done to end such tests

The delegate of Colombia gave details on his country's policy with regard to the problem of ionizing radiation An Institute of Nuclear Energy has been set up and the Ministry of Health has submitted a draft law to the Supreme Council of the Republic to cover all health problems connected with radiation A national committee for radiological protection will be set up to advise the Ministry of Health Maximum permissible doses will be established in compliance with the standards of the International Commission on Radiological Protection All persons using X ray equipment radium radioactive isotopes etc will be required to have a licence and the Ministry of Health will have the power to confiscate equipment in the case of violation of the regulations The delegate of Austria also announced that

a law on radiation protection had been prepared by his Government

The delegate of Switzerland said that there had been a certain amount of opposition in his country to mass X ray examinations many parents had heard of possible genetic dangers and school doctors were apprehensive about the examination of very young children It had been unanimously recognized that the radiation dosages should be kept as low as possible and that X ray examinations of younger children often yielded very little information There was nevertheless a divergence of opinion on the subject among Swiss doctors and it was hoped that WHO would do something to clarify the problem

Public health services

The discussions on public health services covered an extremely wide range of subjects They made it clear that the principle of integrating preventive and curative services and the importance of health services in community development programmes are now generally accepted The importance of integrating maternal and child health services into the general public health services was also stressed by several delegates

Many speakers commented on WHO's work in mental health and in particular on the epidemiological studies that have been in progress for the past two years and are expected to continue for some time to come The need for defining the scope of mental health problems was emphasized

The question of the recruitment and training of nurses continues to preoccupy the public health authorities of the different countries Close attention is being given to programmes for the training of nursing auxiliaries to fill the gap until nursing services are fully staffed

Further research into the epidemiology of dental caries was called for and continued interest was shown in the fluoridation of water supplies as a means of promoting better dental health

Extensive details were given by delegates on the organization and development of the various national public health services

including maternal and child health health education and nutrition services

Education and training

Two points emerged during the discussions on education and training the need for an intensification of public health training at the post graduate level and the need for training more students in the environment in which they will subsequently have to work

In Poland doctors working outside the larger hospitals can take refresher courses every four years The length of the courses is three months and results have been very good Similar courses are provided in Bulgaria In Paraguay public health courses are given to doctors nurses dentists and other health workers already in service In Venezuela university medical training is followed by field work interspersed with courses in public health The principle of having special public health training for doctors was generally endorsed by the delegates

The delegate of Yugoslavia considered that in the provisions for fellowships care should be taken to give fellows training in conditions similar to those prevailing in their own countries in particular there should be more direct exchanges between countries where conditions are comparable

A large number of speakers gave details on the development of education and training programmes and institutions in their respective countries An interesting development reported from Argentina is the establishment of secondary school health courses covering such subjects as health education laboratory work and radiology

In the USSR, special attention is being paid to the training of auxiliary staff for domiciliary care in the proportion of about four auxiliaries for each doctor These auxiliaries concentrate on health education and preventive work thus facilitating the task of the doctors and other health staff

The delegate of France thought that more attention should be given to the ethical and social instruction of the medical student at least one French university devotes most of

the student's first year to that side of his education. The United States delegate stressed the need for more mutual understanding and joint action among the various professional disciplines involved in health

work e.g. the nurse, the doctor and the nutritionist or the doctor, the educator and the nurse. More use might be made, he considered, of team training of workers in various disciplines.

INTERNATIONAL QUARANTINE PROBLEMS

The International Sanitary Regulations adopted by the Fourth World Health Assembly in 1951 revised and consolidated provisions contained in 13 international sanitary conventions and treaties with the aim of ensuring the maximum security against the international spread of diseases with the minimum interference with world traffic. The application of the Regulations is no simple matter since nearly all countries and territories are parties to them with or without reservations. A Committee on International Quarantine was accordingly set up by WHO to deal with the problems that must inevitably arise in their application in the changing world epidemiological situation and in the light of the different attitudes of States to their sanitary needs. This Committee held its seventh meeting in October 1959 and its report was submitted to the Thirteenth World Health Assembly.¹

Special provisions are laid down in the International Sanitary Regulations for six quarantinable diseases: plague, cholera, yellow fever, smallpox, typhus and relapsing fever. There has been a dramatic change in the world situation of plague in the last 8 years: in 1950 about 44 000 cases were reported in 1958 only 271. The disease still exists as sylvatic plague and human cases are restricted to inland areas and persons who have close contacts with wild rodents. Thus the US Government reported 3 cases of bubonic plague in isolated areas where rodent plague is endemic; cases however of no significance to international traffic. The first 2 cases occurred in the State of California within a hundred miles of each other: one an 11 year old boy infected on a camping trip who gave

a history of flea bites while in camp the other a veterinarian. These cases were unrelated and both recovered. The third case a fatal one was a 12 year old girl in New Mexico whose probable source of infection was a jack rabbit.

Since June 1958 no ports where plague exists or is suspected to exist have been listed in the world. The US Government therefore suggested that as the incidence of plague is showing a downward trend the provisions in the Regulations on plague should be revised. The Committee decided not to make any recommendations to that effect as yet but thought that Member States might consider the possibility of bilateral agreements to waive or relax these provisions.

The International Air Transport Association submitted to the Committee its opinion that the provisions on yellow fever would work satisfactorily if only they were implemented. Difficulties—it held—are caused not by the Regulations themselves but by the reservations made by some countries. Thus for example India and Pakistan require information from passengers arriving in their countries about their movements in the 9 days prior to arrival. This reservation to Article 100 of the Regulations (which states that no sanitary document shall be required in international traffic other than those provided for in the Regulations) should—the Association felt—apply to passengers from an infected local area who are unable to produce valid vaccination certificates but in practice it is applied to all passengers arriving from the west even if they have valid vaccination certificates or have not been to an infected local area. Under Article 73 of the Regulations too countries may accept aircraft disinsecting when per-

formed in flight but this procedure is not acceptable to some countries which require spraying to be performed on arrival to the great discomfort of the passengers

The Committee met the first of these objections by pointing out that the reservation made by India and Pakistan to Article 100 permitted the health authorities of the two countries to require information of *all* persons on an international voyage about their movements during the 9 days prior to disembarkation. It followed that the airlines should make this position clear to all their passengers to these countries. As for the second objection concerning Article 73 the opinion of the WHO Expert Committee on Insecticides is that disinsecting in flight cannot for technical reasons be recognized at present. However work in progress on the problem of disinsecting aircraft efficiently and without disturbing the passengers might shortly change the picture and remove this objection. In India too an experiment is contemplated whereby aircraft will still be sprayed on the ground but passengers will be allowed to disembark straightaway.

Another problem raised by the International Air Transport Association is that of the aircraft passenger arriving in India without a valid yellow fever certificate in an aircraft that cannot present proof that it has been properly disinsected before arrival in India. India and Pakistan accept disinsectization certificates from certain countries only and the passenger may have passed through so many countries since he left a yellow fever area that he has mislaid his certificate because it had ceased being required or he may even not have been anywhere near a yellow fever area. Whatever the position the passenger risks being refused entry or being detained in isolation. This—the Committee agreed—is a genuine problem that is at present under discussion between the Governments concerned and WHO. The Committee also pointed out the benefits to health administrations of yellow fever receptive areas of keeping the area within the perimeter of every airport free from *Aedes aegypti* in its larval and adult stages in accordance with Article 20 of the Regulations

The Government of India informed the Committee that infants and young children leaving a yellow fever infected area within 9 days before arrival in India are often not vaccinated against the disease. They are therefore kept in isolation for 9 days from the date of last possible exposure to infection. This practice is objected to by the Government of Uganda between which country and India there is considerable passenger traffic. The Uganda Government based its objection on expert medical opinion in East Africa and the United Kingdom to the effect that vaccination should be postponed till at least the age of 6 months and preferably 1 year because of the risk of encephalitis and on the further point that the vaccinator even if ready to take the risk of vaccinating against yellow fever may still wish to follow the medical view that at least 21 days should elapse between smallpox vaccination and yellow fever vaccination of infants—whom parents travelling to India often take with them even if only a few days old. This objection was supported by the Kenya Government, which pointed out that it had excepted children under 1 year old from the requirement that that they be vaccinated against yellow fever and cholera before entering Kenya. The question of a relaxation of this requirement has been raised with the Indian Government.

Cases were reported throughout the year of smallpox infection being carried from one country to another by international transport. Ten cases occurred in Aden Colony and 122 in Aden Protectorate (with 33 deaths) the infection having been introduced from Yemen. In Ceylon there were 27 cases (with 2 deaths) in a village 2 miles from a port where boats from India occasionally call and unload cargo. The first case was admitted to hospital but refused to stay there the other cases occurred among his friends and relatives. Between 4 December 1958 and 21 January 1959 there were 18 cases of smallpox at Heidelberg and 1 at Kaiserslauten in the Federal Republic of Germany. The outbreak was caused by a German doctor who fell ill before he left India and who flew hom via Colombo Geneva and Zurich, taking the train from Zurich on to Heidelberg. Among

the student's first year to that side of his education. The United States delegate stressed the need for more mutual understanding and joint action among the various professional disciplines involved in health

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THE CONTROL OF NARCOTIC DRUGS

Since its first WHO has played an important part in the control of narcotic drugs by advising on the medical aspect of drug addiction and addict-on-policing drugs. Speaking at the Thirtieth World Health Assembly the Director of the Department of Narcotic Drugs M. G. Y. T. S. D. of the Department of Narcotic Drugs of the United Nations has reviewed developments in international narcotics control. He stressed the importance of the

[The Single Convention on Narcotic Drugs] which consolidates and partly revises the nine existing narcotics treaties will be finally drawn up and signed at a plenipotentiary conference which will be held in New York early in 1961. Since this plenipotentiary conference will be the last stage of a long and intricate task in which WHO has taken a full share and since it will constitute something of a landmark in this subject there are a few comments that might appropriately be made at this time.

The international narcotics control system embodied in the treaties is one of the oldest international economic and social activities having got going in fact at a conference called as long ago as 1909 in Shanghai at the instance of President Theodore Roosevelt of the United States of America. Not unnaturally this system has in some respects rather an old-fashioned look now, being based essentially on specific obligations undertaken by governments towards each other rather than on the system of support or technical assistance in the wide sense which is now the typical *modus operandi* of international organizations. However it provided one of the earliest examples of an international secretariat being entrusted with administrative responsibilities and not simply study functions on behalf of the participating governments.

On one side of the work, namely that of regulating the medical or legal trade in narcotics in such a way that a minimum is overproduced or is available to leak into the illicit traffic, the system has on the whole

been largely successful. On the other side that is the enforcement work of police, customs and excise and similar services which operate directly against the illicit traffic, the situation has certainly improved as compared with former times, but we have still a long way to go.

We are often asked in the United Nations why it is that the intergovernmental narcotics body and its secretariat is part of the United Nations and not part of WHO and of course this question was considered at the time the San Francisco Charter was being drawn up. The treaty system endeavours to reconcile the requirements on the one hand of a satisfactory supply of narcotics for medical use—and this has both a public health and a commercial side—with on the other hand the police requirements of combating a traffic that is a major public nuisance as well as an economic burden in a number of countries. For this reason, the governments at San Francisco decided to place the function in a general international organization and up to now this view has continued to prevail.

The unit concerned in the United Nations Secretariat was transferred from New York to Geneva in 1955, one of the main reasons for this move being to be nearer WHO and in fact the unit does enjoy very close relations with the WHO Secretariat.

The present time marks a turning point in the subject of drug addiction and narcotics control in a number of ways which may be summarized shortly by reference to the following features—and these are the features in the situation of course which will underlie the work of the plenipotentiary conference at the beginning of next year.

the secondary cases were 6 physicians 2 nurses and other members of the hospital staff 2 female patients the charwoman of the primary case and a barkeeper from Kaiserslautern who was infected at Heidelberg Two patients died Three cases occurred in Ghana one of a Liberian who developed the disease two days after arrival by ship in Accra another of a woman who came from Togo before her rash had healed and the third of her husband Three known cases occurred in Iran of persons who had crossed the border at other than the official crossing points From Malaya were reported 4 imported cases of Indians disembarking from a ship at Penang Other cases were reported from Pakistan the Philippines the United Arab Republic and the United Kingdom Noting the numerous instances of imported smallpox and the subsequent epidemics produced in some countries the Committee stressed the need for the use of potent vaccines for correct vaccination procedures and for medical and other personnel coming into contact with travellers maintaining a high level of immunity against smallpox by repeated vaccination It also drew attention to the advantages of dried smallpox vaccine and to the arrangements made for its supply in several WHO Regions

The Government of Spain reported the occurrence of one fatal case of typhus presumably contracted in France Cases also occurred in Algiers and in Jordan The first of these was a Moroccan pilgrim returning from Jeddah he was kept in Algiers till he recovered then repatriated the Moroccan authorities being informed in accordance with Article 104 of the Regulations

Article 103 of the Regulations allows States to impose additional sanitary measures on migrants seasonal workers or persons taking part in periodic mass congregations Basing itself on this provision the Government of Saudi Arabia laid down that all arrivals from cholera infected areas must produce a vaccination certificate against cholera showing 7 injections at one week intervals if 5 days had not elapsed since they left those areas they would be isolated During the annual Mecca Pilgrimage season all travellers coming from any area cholera infected or not must produce this same certificate These requirements and a measure relating to smallpox led to a report from the Kenya Government of inconvenience caused at Nairobi Airport because of lack of knowledge of what was needed in Saudi Arabia The Committee appreciated the difficulties involved in the sanitary control of the Mecca Pilgrimage and hoped that information about new measures would be given to WHO early enough to be passed to other health administrations in good time

The price of keeping the world as free as possible from these deadly diseases is unrelenting vigilance The cases of smallpox that have occurred show how easy it is for an outbreak to start and how important it is not to relax the control established by the International Sanitary Regulations These Regulations the fruit of years of discussion and treaty making by the nations have been amended by World Health Assemblies in 1955 1956 and 1960 and are constantly being reviewed by the Committee on International Quarantine in the light of changing events in the field of the quarantinable diseases

developed as it had done at the time of the invention of heroin and other drugs and in fact synthetic drugs present at this moment no significant problem in the illicit traffic. At the same time in a number of countries the medical profession gets information on new synthetics including information on their dangers before they come into general clinical use.

Sixthly the technique of technical assistance has been superimposed on the old treaty system. A certain amount of technical assistance has been given in recent years under the Expanded Programme and the regular programmes of the United Nations and the agencies in addition last year the United Nations General Assembly established a supplementary fund to boost technical assistance in the field of narcotics control.

Seventh and lastly all medicine is of course interconnected as your President reminded you in his opening remarks and

the rigid dividing lines between attitudes to "addiction producing" narcotics proper to "habit forming" drugs with some but not all of the same characteristics and to such groups of substances as barbiturates tranquilizers amphetamines etc. are no longer so tightly drawn as they once were. In fact both in the United Nations and in WHO it has been in mind that some of the machinery of narcotics control may perhaps be useful in dealing with some of the problems set by these new groups of substances.

These last mentioned developments show that in spite of its relatively great international age the international narcotics control system is not yet suffering too greatly from hardening of the arteries. With the continuation of the present excellent co-operation and support of Member governments it has still its own small contribution to make to the welfare of the international community.

IMMUNIZATION AGAINST COMMUNICABLE DISEASES

These discussions have been the main topic of the annual World Health Assembly to hold technical discussions which are distinct from the official proceedings of the Assembly. The chief result is a summary of the technical discussions held at the Thirteenth World Health Assembly. A complete report on these discussions will be published in Public Health Papers.

The topic chosen for the technical discussions during the Thirteenth World Health Assembly was the role of immunization in communicable disease control.

Dr V. M. Zhdanov of the USSR who acted as general chairman opened the discussions with a brief sketch of the uses of vaccines against the most widespread infectious diseases. Against some of these diseases vaccines are the most effective weapon available: smallpox, diphtheria, poliomyelitis, whooping-cough and in the near future it is to be hoped mumps. Against other diseases such as tuberculosis and typhoid fever immunization although of great importance plays only a subordinate part. Against yet another group of diseases such as brucellosis

tularemia and those transmitted by arthropods from animal reservoirs to man vaccination is very useful for protecting those particularly exposed.

The participants then split up into nine groups whose discussions are summarized below.

Vaccination priorities

It was considered that each country should itself determine the priority to be given to the different immunization programmes taking the following factors into account:

(1) The prevalence of the disease concerned its dangers and its economic implications. These vary greatly from one country to another and even between different areas in

The first feature of the United Nations/WHO period so to speak is the increasing and now very widespread acceptance of the view that an addict should be regarded as a patient rather than a criminal. In fact the change in this respect is now getting so well established that it is occasionally necessary to remind a public health department that an addict can sometimes be a criminal as well as a patient.

Second feature—it is still necessary to bear in mind that drug addiction continues to be a large scale public health problem although of course a much lesser one than malaria, tuberculosis and some others which you have been considering. But it is still well up in the secondary group. There are still in the world millions of addicts to opium and opiates; there are still millions of habitual cannabis users (the term cannabis being used to cover all forms of this substance such as hashish, charas, bhang, ganja, dagga, tamma, djamba, maconha, marihuana, kif, takroui, hemp, kamonga and so on) and there are still millions of coca leaf chewers. This year's paper on the incidence of drug addiction in the world prepared for the United Nations Narcotics Commission showed 29 countries or non self governing territories with an addiction rate of more than one addict per 1000 population and 21 further countries with a rate of at least one addict per 5000 population. Unfortunately also some of the worst forms of addiction and particularly addiction to heroin are gaining ground and gaining ground in some relatively under developed countries as well as in more advanced ones.

Third feature—the economic loss involved in addiction and its problems is now being more generally recognized. The federal authorities in the United States of America for example some little time ago estimated that the annual loss attributable to the narcotics problem in their country was of the order of \$500 million a year.

Fourthly the prognosis of addiction is now more optimistic than it used to be at any rate in the numerically largest sector. While the individual addict whose addiction is a sign of severe personality defects still remains a very

difficult patient the distinction has increasingly come to be made between this kind of addiction and what is usually now called mass or social addiction. In mass or social addiction the taking of the drug in the words of one of [WHO's] expert groups is mainly due to social, environmental or cultural factors. Among these may be included the historical and cultural acceptance of the use of certain drugs by some segments of the population. This group would comprise those persons who are exposed to some more or less accidental stress such as exhaustion, hunger or poverty and would predominate in countries where the drugs used are relatively easily available and the cost is not prohibitive. In fact as regards mass or social addiction the experience of Iran since 1955 has been nothing less than decisive for this situation occurring anywhere in the world.

Many of you will remember how Dr Saleh in this hall when he was Dr Adib's predecessor as Minister of Health of Iran described the reforms which the Iranian Government commenced in 1955 concurrently with its policy decision to discontinue the production of opium for medical purposes. The level of opium addiction he then estimated was something of the order of 1 in 15 to 1 in 20 of the population. The energetic measures taken by the Iranian Government changed the whole climate regarding this problem. Health education and propaganda played a major part in the reforms; great numbers of opium users ceased to be such without the necessity of specific medical treatment although this was made available for the most serious cases. In a few short years the problem has been reduced to manageable and relatively small proportions.

The fifth feature—the typical preventive approach of public health has been applied in this field. Only one synthetic narcotic namely pethidine was in effective use in 1946 and the rapid development of synthetic narcotics caused new control and other problems. This time however control measures and particularly the Paris Protocol of 1948 were taken before illicit traffic

conditions of each country. In the more backward areas mobile teams will be formed which should also be trained for other types of health work since they will have to work in places lacking medical services. Gradually these teams will tend to be replaced by fixed health centres situated in the larger towns. From this stage onwards the immunization programmes will remain in the hands of the public health services or of private practitioners according to the medical organization of the country.

In most cases the cost of immunization is borne by the State. The general opinion was that this system is necessary if all socioeconomic levels are to have an equal opportunity of benefiting from immunization. Apart from humanitarian considerations this is essential if programmes are to be effective.

Two basic schedules of immunization were outlined: one for countries with adequate health services and the other for those without such services. These schedules can be modified according to local conditions.

Production, standardization and testing of vaccines

In the production of most biological materials the mere following of prescribed directions does not guarantee the final result. Consequently many countries have set up suitable control laboratories for examining national and imported products. In other countries, however, control laboratories if they exist at all are badly equipped or are those that produce the vaccine which is hardly a desirable situation.

Again the quality criteria used by the various national control laboratories differ considerably because of this WHO has established an Expert Committee on Biological Standardization with the task of recommending international minimum requirements for vaccines and similar products. It was considered that it would be of great value particularly for many of the smaller countries if the World Health Organization could help to make facilities available for the control testing of vaccines on an international basis. Similarly there is a need for

centralized manufacture of those vaccines that cannot readily or economically be produced on a small scale or whose production requires highly experienced personnel with special equipment. It is also urgently necessary to develop methods for the large scale manufacture of vaccines which may be required at any given moment for the control of a major epidemic e.g. influenza vaccine. Furthermore it was agreed that research was necessary for the production of purer antigens, the solution of special problems raised by the application of certain vaccines in tropical areas, the continuous evaluation of the effectiveness of immunization programmes and clarification of the relationship between immune response and the public health importance of a vaccine.

Evaluation of vaccination programmes

During the last fifteen years procedures have been developed making it possible through field trials to assess the effectiveness of immunization with increasing accuracy. By carrying out combined field and laboratory studies the efficacy of future immunization programmes can be predicted. Such studies must satisfy the two basic principles of comparability and reproducibility. The first of these principles ensures that the degree of protection conferred by immunization on a given community is due to the vaccine itself and not to various chance influences. It calls for comparison of the incidence of the disease in two or more groups identical in all respects except for the factor of vaccination. The principle of reproducibility ensures that in future vaccination programmes the same degree of protection will be obtained for the population as was observed in the field trial. The method of vaccine production must be described with complete accuracy and the laboratory studies must include assays of different vaccine preparations in laboratory animals in order to develop an assay method giving results that parallel those obtained in the field, thus permitting the protective value of future types of vaccine to be determined by laboratory assay alone.

one and the same country. In addition they may vary over the course of time in a given place.

(2) The advantages of immunization programmes in comparison with other methods for controlling the disease.

(3) The efficacy of the vaccine available and the risks entailed in its use. If priority is to be given to a vaccination programme the vaccine must be of proven efficacy and its dangers very small as compared with those of the disease attacked.

(4) The availability of the vaccine in sufficient quantities and the economic implications of the programme (costs of the vaccine, cost of training personnel, salaries, travel expenses, etc.).

(5) International aspects. These are most important for example even in countries where smallpox and diphtheria have been eradicated it is necessary to continue immunization against these diseases since they still exist elsewhere.

(6) Public demand and cultural factors.

All the groups participating in the discussions agreed that smallpox vaccination should have the greatest priority.

Special attention should also be paid to immunization against diphtheria, whooping cough and tetanus and it is advisable to administer a triple vaccine against these illnesses. The priority given to tuberculosis vaccination depends on the prevalence of the disease. The possible prophylactic action of BCG against leprosy was mentioned and increased research into this question was advocated. The priority given to poliomyelitis vaccination also varies from one country to another. It was recommended that the systematic use of live poliovirus vaccines should be preceded by a study of possible variations in the virulence of the original strains after serial passage in human beings.

In general indications for other forms of immunization are limited and it is more difficult to lay down general rules. The groups considered that WHO should take over the co-ordination of information about new experiments and vaccination programmes

and transmit it to Member countries to assist health authorities.

Complications and side reactions to immunization

The problem of secondary reactions to immunization was dealt with with special reference to yellow fever, smallpox and whooping cough vaccines. There is an evident need for research to elucidate and eliminate the causes of these reactions. Precise information on each particular case should be collected and evaluated statistically.

Development of vaccination programmes

A decision whether vaccination programmes should be made legally compulsory or be voluntary can only be based on the level of health education of each community. In the words of Dr Zhdanov, "It is hardly possible here to work out general recommendations applicable to all countries since in trying to solve this question we come up against variations in social structure, historical differences, different habits and customs and special features of the health services which have become so varied in the different countries. One thing seems to me indisputable and that is the general tendency to attach greater importance to the role of the population itself in carrying out an immunization programme. The higher the level of the public's medical knowledge and health education and the closer the contact between the health services and the public the less necessary are all kinds of restrictive and compulsory measures. An attempt should be made gradually to replace compulsion of the population by persuasion through health education though it should be remembered that immunization is not a personal matter but concerns the whole community. Some participants pointed out the danger of misinterpretation by the public of the waiving of compulsory measures. Furthermore unforeseen situations may arise in which compulsory vaccination is essential for the protection of the community."

The organization of immunization programmes will vary according to the health

conditions of each country. In the more backward areas mobile teams will be formed which should also be trained for other types of health work since they will have to work in places lacking medical services. Gradually these teams will tend to be replaced by fixed health centres situated in the larger towns. From this stage onwards the immunization programmes will remain in the hands of the public health services or of private practitioners according to the medical organization of the country.

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Current vaccination programmes can be evaluated by means of sample surveys on the proportions and social distribution of the community immunized and on the effectiveness of the vaccination procedure as shown by skin reactions or serological tests. To

assess the degree of clinical protection conferred by a vaccination programme reliable statistics of both mortality and morbidity are needed as well as a proper appreciation of the effect of other public health measures and social improvements.

PROGRESS IN SMALLPOX ERADICATION

It is generally considered that smallpox can be eradicated from most endemic areas if 80% of the population is vaccinated or re vaccinated within a period of 4-5 years. About 75 000 cases were officially reported in 1959 and although notifications were only provisional and some countries did not send in any reports it seems clear that the smallpox problem is not to be compared with that say of malaria. If the disease is easy to eradicate and the problem of the sheer weight of numbers of those suffering from it is not a major obstacle why then has it not been eradicated?

Some of the answers to this question were given in an article in the *Chronicle* last year.¹ It costs money to establish smallpox eradication services. The services that exist in some countries have other work to do and cannot spare the time to deal with smallpox with sufficient thoroughness. The organization of the medical services is too loose to enable a systematic attack to be made on the disease. Not enough trained staff is available. The vaccine available is sometimes unsuitable for mass vaccination especially in tropical or semi tropical countries. Some of these difficulties are common to all programmes in the less developed areas of the world. Others were mentioned by delegates at the Twelfth World Health Assembly. In some countries the public does not co operate either from ignorance, prejudice against vaccination or apathy—apathy being a marked feature in communities that have had no smallpox for a period of years. Communications or transport facilities may be bad or an outbreak may occur among isolated communities

remote from medical aid of any kind. One delegate stressed the psychological aspect of resistance to vaccination. Many of his countrymen looked upon smallpox as a punishment inflicted by God and some blamed medicine imported from abroad. People refused vaccination with imported vaccine and some of them deliberately infected themselves with fluid from cases. In the face of such prejudice legislation to make vaccination compulsory would make slow head way.

A dramatic illustration of the difficulties of dealing with smallpox is furnished by the epidemic that broke out in East Pakistan in October 1957.² The population of this province of Pakistan is 46 million and lives in the delta of the Ganges and Brahmaputra rivers on land consisting of alluvial soil deposited by these rivers much of it covered by water when the monsoon breaks. The province is criss-crossed by waterways varying from mere streams to broad meandering rivers a mile across and boats are the easiest means of communication outside the main towns. The people are mostly Moslems and many of the women are in purdah. The centre of village life—by far the majority of the people live in villages—is the village tank, an artificial pond where people come to bathe, wash clothes, urinate, defecate and draw water for drinking and cooking.

In the first six months of 1958 44 736 cases of smallpox were reported and there were 20 444 deaths. To complicate matters an epidemic of cholera was also raging at the time with 10 438 cases and 6684 deaths in the same period. Smallpox epidemics occur

every few years in East Pakistan and vaccination is carried out on a large scale 5 to 16 million people having been vaccinated annually from 1948 to 1957 according to the official reports. Nevertheless this was a major epidemic.

There are only 400 sanitary inspectors in East Pakistan i.e. about one per 100 000 population and very few doctors and nurses in proportion to the population. In April 1958 the Chief Minister delegated responsibility for dealing with the epidemic to a citizens committee of 60 persons and a vast volunteer vaccination movement was begun as the medical services could not cope with the work. WHO governments and voluntary agencies sent vaccine and international epidemiological and vaccination teams. The Government and the epidemic control committee agreed that the objectives should be to vaccinate 80% of the people within 6 months to stamp out the remaining traces of infection in the subsequent 6 months to enforce strictly the law requiring children to be vaccinated and to make an attempt to re-vaccinate the population every few years. All kinds of volunteers were enrolled their quality and enthusiasm naturally varying greatly among the most successful were schoolchildren particularly as they could visit women in purdah. Vaccination needles were in short supply so ordinary steel needles were used and then given to the persons vaccinated—an innovation that met with approval and at the same time did away with the need for sterilization to prevent cross infection. Vaccination techniques were naturally of the simplest.

By the middle of May 1958 40% of the population had been vaccinated and in June 2 million were being vaccinated weekly about 30 million in all being vaccinated in the first 6 months of 1958. The number of new cases fell from a peak of 3000 a week in May to 300 in June. By July the monsoon had come smallpox was less severe vaccinations had almost ceased and the international teams were preparing to leave.

In spite of difficulties—the poor communications the lack of staff the transport problems the seclusion of many of the

women—one of the leaders of a team from the Communicable Disease Center Bureau of State Services USA, which visited East Pakistan during the epidemic came to the conclusion² that eradication of smallpox from the country is feasible even though this is one of its most strongly established endemic and epidemic foci. Widespread vaccination is needed to reduce the prevalence (Dr Usher thinks that in the more densely populated parts of East Pakistan a substantially higher percentage than 80% would be needed) and then outbreaks would be controlled by surveillance and containment.

Plans for an eradication programme have been under study in East Pakistan and it is expected that the programme will begin soon. The production of dried vaccine has started and WHO has provided laboratory services for testing the vaccine.

In the world as a whole progress is being made. As against a total of some 248 000 cases reported in 1958 so far only 75 000 have been reported in 1959 (see Figs 1 and 2 which should be compared with Figs 2 and 3 in the Chronicle article referred to above). In India and Pakistan which contain much the largest endemic foci of smallpox the number of cases fell from 216 000 in 1958 to 51 000 in 1959 the 1958 level however was unusually high because of the epidemic in East Pakistan. The number of cases in Asia outside India and Pakistan fell from 30 000 in 1958 to 22 000 in 1959. In Africa the next most affected continent 14 000 cases were provisionally recorded in 1959 outside Liberia in 1958 the number had been much the same and there had been at least 5000 cases in Liberia. Some 3000 cases were recorded in the Americas and a few cases due to imported infection in Europe. All cases on board ship or imported by air originated in Asia.

What developments have taken place during the year? In India a joint meeting of the Indian Council for Medical Research and the Government Central Expert Committee was held to study smallpox and cholera. The Central Expert Committee as a result

FIG 1 NOTIFICATION OF SMALLPOX CASES IN PORTS AND AIRPORTS 1959

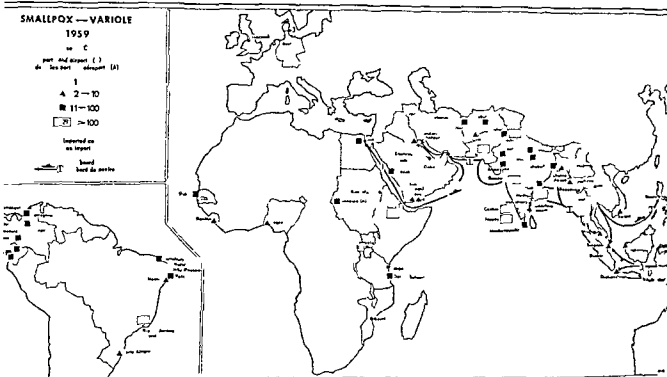
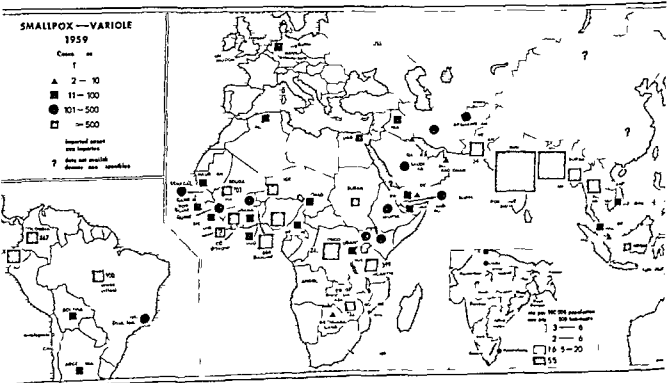


FIG 2 NOTIFICATION OF CASES OF SMALLPOX IN 1959



recommended the launching of a national smallpox eradication campaign with the object of vaccinating the whole population and the creation of a suitable organization equipped with the powers needed to conduct the campaign. These recommendations have been accepted by the Government of India which has now sanctioned funds for the launching of 16 pilot projects in all the States of India. A plan for WHO/UNICEF aid in the establishment of production units for freeze-dried vaccine at two vaccine production institutes was presented to the UNICEF Executive Board in March 1960.

In the next largest endemic focus Africa a regional conference on smallpox eradication was organized in 1959 and attended by representatives from 20 countries of the region. A great deal of information was exchanged and the basis was laid for national eradication campaigns and for co-operation between the various countries concerned. International assistance it was recognized would be needed for most African countries if they were to embark upon successful eradication campaigns. Much work against smallpox is already being done in some African countries. In the Belgian Congo for example about 50% of the population is vaccinated or re-vaccinated every year. In what were formerly French Equatorial and French West

Africa mass vaccination campaigns have been systematically carried out for many years about 8 000 000 vaccinations being performed yearly in a total population of about 28 000 000. In Liberia vaccinations are performed at fixed centres such as clinics and schools but the health authorities have expressed their willingness to embark upon a mass vaccination programme.

The smallpox eradication programme that was begun in the Americas in 1952 is progressing although more slowly than was originally expected.

The situation is therefore that some countries in which smallpox used to be endemic have through effective vaccination campaigns succeeded in reducing the number of cases to a degree that augurs well for the possibility of eradication in the near future. Others have been active in planning and organizing eradication programmes that are expected to start in 1960. Others still are no further advanced than the planning stage if even that. In most countries the difficulties are mainly financial or administrative but the expenditure on an eradication programme it must be remembered is small compared with the cost in money and—more important—in human lives and suffering caused by the continuous presence of a disease that can be eradicated.

In the underdeveloped areas release of the resources of the countries from the tangled undergrowth of mass disease is a prerequisite of development. Just as the Panama Canal could not be constructed until Gorgas had mastered yellow fever so the technical resources of these countries cannot be effectively exploited until the conditions of better health have been created. Somehow government will have to finance the capital requirements of health.

United Nations (1952) Preliminary Report on the World
Socio-Economic Situation. Special Report. Standards of Living
New York

YAWS CONTROL IN THAILAND *

What can be achieved with modern yaws control methods has been demonstrated recently in Thailand where only ten years ago 11 million people were living in yaws prevalence areas the proportion of clinical cases sometimes reaching as much as 75 / corresponding to a serological infection rate of more than 60 / An antiyaws campaign was carried out in 44 provinces between 1950 and 1959 By the end of November 1959 not a single infectious case remained in 10 of these provinces while in 33 others the percentage of cases with infectious lesions did not exceed 0.09 /

The estimated population of Thailand is about 22 million and there are 80 government and some non government hospitals in the 71 provinces into which the country is divided Only about 14 % of doctors in the country work outside Bangkok Five regional and 71 provincial health officers supervise the medical activities of their respective areas and are in charge of the network of first and second-class health centres spread over Thailand The distribution of these centres is uneven and in the areas where yaws is most prevalent there is only one health centre per 40 000 population

The Department of Public Health in the Thai Ministry of Health has a venereal disease control division under a full time director This division started yaws control after the Second World War setting up 5 mobile units each consisting of a medical officer a sanitary inspector and 3 dressers These units operated in easily accessible areas along the main roads treating cases with arsenicals in a course of from 2 to 7 injections In the first six months of 1948 101 382 cases were treated in 1949 102 290 During this period large amounts of short acting penicillin began to be distributed by the Government as no long acting penicillin was then available

In 1949 the Government asked for WHO and UNICEF assistance as it had become clear that no significant change had taken place in the prevalence of yaws in the country Treatment was still being carried out with

the arsenicals long acting penicillin was not being used the areas treated were of limited size latent cases and contacts were not being treated the actual distribution of the disease and its severity in the various provinces were known only to a limited extent and the Thai Government did not have the facilities or trained staff to cope satisfactorily with a full scale treponematoses control programme

As a first step in helping the Government's efforts a WHO consultant visited Thailand and made a preliminary assessment of the yaws situation in close co operation with Thai medical officers It was estimated that the general prevalence of clinical yaws in most provinces was between 0.5 / and 3.5 % but that there were some scattered holoendemic areas with a prevalence of as much as 25 / This corresponds to an actual infection rate of from 10 % to more than 60 / of the population as based on serological findings A plan of operations was drawn up and received final approval on 21 April 1950 By December 1950 a WHO international team had arrived in the country a medical officer a serologist and a public health nurse Not less than 11 million people—half the population of the country—living in yaws prevalence areas had to be surveyed and re surveyed The Thai Government accordingly proposed that the programme be extended and this was approved in 1952 The purpose of the extended programme was to control yaws systematically throughout the country in areas of infection to examine and re examine the population in these areas treat

*Based on an unpublished summary report prepared by WHO Headquarters Geneva

all cases discovered and give prophylactic treatment to their contacts and so to reduce the reservoir of infection to the level where it was no longer a public health problem but could be controlled by the rural health services. To carry out this programme local personnel had to be trained in methods of diagnosis treatment and control of yaws in the administration of a mass campaign and in public health measures for the improvement of rural health standards. When the campaign had succeeded in reducing the prevalence of yaws to a sufficiently low level the yaws control services were to be integrated into the permanent public health services of the country.

At the outset of the WHO-assisted campaign an intensive training programme was started. The staff of the existing mobile units were given a refresher course. In 1951 a training school was opened in Rayburn. By the end of 1958 the number of field teams had increased from 5 to 31 comprising some 250 people.

To begin with all active and inactive cases of yaws persons with a history of yaws and anyone suffering from joint and bone pain were treated with 8 ml procaine penicillin G in oil with 2% aluminium monostearate (PAM). Children received a reduced dose. After the First International Symposium on Yaws Control, held in Bangkok in 1957 this scheme of treatment was changed: latent cases and contacts were given 3 ml PAM; adult cases 6 ml; children aged 2-10 years 4 ml; and children one year and under 2 ml.

Between May 1950 and November 1959 a total of 8 696 775 people (58.3%) out of an estimated population of 14 927 027 inhabitants in 44 provinces were examined; of these 39 369 (0.45%) had infectious and 411 904 (4.7%) active lesions. A first re-survey was carried out in 33 provinces with a population of 12 592 117 and 3 819 544 persons were examined (30.3%). Infectious lesions were found in 8036 (0.21%) and active

lesions in 93 814 (2.4%). In a second re-survey in 23 provinces with a population of 9 719 977 487 persons (0.02%) with infectious and 21 638 (1%) with active lesions were found among the 2 119 710 (21.8%) persons examined. In a third re-survey in 8 provinces with a population of 4 392 895 1 219 015 people or 27.7% of the population were examined and 1066 (0.09%) infectious and 31 838 (2.6%) active cases were found; a higher prevalence being shown because the more straightforward method of school checking re-survey was employed. Finally a fourth re-survey covering 2 provinces with a population of 1 039 941 was carried out in the north-east of the country as there the prevalence of yaws had originally been highest. Up to November 1959 557 513 people (53.6%) had been examined of whom 495 (0.09%) had infectious and 4722 (0.8%) active lesions.

During treponematoses control activities in Thailand up to November 1959 not less than 16 412 557 examinations were made and 49 453 infectious cases were diagnosed.

In 1953 the WHO advisers had expressed the view that yaws is a disease in recession in Thailand because the proportion of late lesions in the population is high; active lesions are relatively rare and there is a steep increase in the seroreactor prevalence in age groups above 7 years. Apart from the effect of the campaign this recession is probably due to the improvement in the living standards of much of the population. Now with the work that has been put in by the treponematoses teams no less than 10 provinces could not muster a single infectious case in the last re-survey and in the remaining provinces the rate of infectious lesions did not exceed 0.09% (except in one province with 0.5%). In practically all the 44 provinces the prevalence of yaws has been reduced to such a low level that integration of anti-yaws activities in the work of the rural health services is now feasible; in fact it has begun in 4 out of the 10 provinces where there were no infectious cases.

ENDEMIC AND EPIDEMIC GOITRE IN ITALY

The almost legendary disease of epidemic goitre reappeared in 1940 in the Italian Alps and Piedmont attacking thousands of soldiers in the Province of Cuneo, and in subsequent years spreading to the civil population of the other provinces of Piedmont. It died out in this part of Italy in 1945 but continued to flare up in small foci in Lombardy, Liguria, Emilia, Tuscany and Venetia up to 1948.

What is known about this epidemic? We know that it appeared in an area where endemic goitre had existed for a long time that it raged for several successive years from spring to autumn that it affected groups or individuals coming from outside the epidemic areas and spread to regions from which endemic goitre had disappeared decades before. This is not a fresh epidemiological observation. A French medical dictionary of the nineteenth century¹ notes under cretinism that Children and healthy adults born in countries free from goitre fairly quickly acquire goitre and become more or less cretinous when they move to endemic areas. Veritable epidemics of goitre have been reported among soldiers.

The Italian epidemic of 1945-1948 affected not only man but also dogs and pigs in some localities. At Monferrato it was shown that goitre appeared both in individuals drinking water from the mains and in those drawing their water from wells and tanks. Most of the goitres disappeared after some months but some persisted and a few were still visible after some years. Administration of iodine brought no improvement and had no prophylactic effect.

In an article in a recent issue of the WHO Bulletin, Costa & Mortara review recent work on endemic goitre and epidemics among soldiers and in the civil population of

Italy. Methods of investigation have steadily developed and improved in that country but it is not easy to find a solution to the problem of goitre.

Most of the authors who have studied the Piedmont epidemic admit a relationship between epidemic and endemic goitre. This relationship however has been questioned in the case of Tuscany where epidemics without endemic goitre have been known. An analysis of recent data and of the data available on successive epidemics from 1700 on leads Mortara to the conclusion that the two forms of goitre are diagnostically identical. He emphasizes in particular the cerebral symptomatology that is clinically manifest to a greater or lesser extent in the two forms and is inclined to the view that the central nervous system is affected with elective but not exclusive localization in the autonomic centres in the diencephalon. The authors consider that the cerebral phenomena manifested in acute epidemic goitre might provide some clues to the cerebral changes that result in the cretinism and deaf muteness of endemic goitre. An important fact is that endemic cretinism is still to be found in its old sites—the Alps and the southern Apennines including several surrounding hill and plain areas—but does not appear in association with endemic goitre in the south of Italy. Cretins are rare in the new generations and among them myxoedema and dwarfism due to thyroid insufficiency are less frequent.

Research

Epidemic goitre. War difficulties and the comparative lack of knowledge about the symptoms of thyroid dysfunction impeded research at the time of the Piedmont epidemics. Most of the tests were normal. Neuropenia was observed with lymphocytosis and the blood iodine level was high. No

Dechambre A. Duval M. & Lereboullet, L. (1885) *Di dictionnaire des maladies mémoires*, Paris.
Costa A. & Mortara, M. (1960) *Bull. Wld H. & Org.* 22, 473

serum antibody to human thyroglobulin was found

Endemic goitre In the Piedmont it has been found the uptake of radio iodine is generally above normal in the mountain hill and plains foci of endemic goitre and the iodine taken up is organically fixed in the thyroid. The excretion curve of radio iodine is slow in comparison with that in hyperthyroidism. Thyroid clearance of iodine is high kidney clearance usually normal. Body growth, bone maturation and sexual development in children are the same in endemic and non-endemic areas. However investigators cannot forget the impression of mental and physical misery in certain well known endemic areas where it is not rare to find individuals who are not in a condition to attend school and are unfit for social life.

The endemic environment During the epidemics of goitre in the endemic area the environmental factors traditionally considered to influence the disease—water malnutrition deficiencies consanguinity and shortage of iodine—all received attention. But none of these factors seems to be responsible for endemic goitre or for the Piedmont epidemics. The epidemic spread gave rise to the hypothesis of an infectious origin with transmission by an intermediate host favoured by hot weather—for the epidemics occurred

mainly in summer. In Umbria the heavy consumption of brassicacae containing goitrogenic factors and in mountain areas a diet lacking in proteins and in some essential amino acids were blamed. Endemic goitre is essentially rural in character and Mortara considers that its frequent occurrence in localities where sheep are raised in stables may be more than a simple coincidence. The possible influence of radiation has not been ruled out but radon has been sought in the atmosphere and in the water and atmospheric radioactivity has been measured without any relationship with endemic goitre being found. The iodine content of air and water and the excretion rate of iodine have shown no significant differences between endemic and non-endemic areas.

Goitre is not a static disease in Italy. It was wide spread in the last century and the first decade of this century then its prevalence decreased. It appears now that the descending curve has been arrested. Goitre has become more common in central and southern Italy and has flared up in localities of northern Italy which had for some time appeared to be free from it. In certain areas the epidemics seem to have left endemic goitre in their train. The phenomenon of epidemic goitre in Italy has given rise to observations and research that are not paralleled in other countries but so far its origin remains unexplained.

Epidemiological and Statistical Information

REPORTING OF ZOONoses IN THE AMERICAS

Many of the zoonoses are known to occur in the Americas but information on their distribution in man and in animals is incomplete. Human cases of certain of these

diseases are notifiable in some countries of the Region and statistics are forwarded to the Pan American Health Organization (PAHO). Except for rabies however little has been done until recently to assemble the available data on known cases of zoonoses both in man and in animals.

Based on report prepared by Drs A. H. H. R. R. Potter, R. F. C. Chamberlain for the Advisory Committee on Tropical Medicine, U.S. National Academy of Sciences—National Research Council

FIG 1 REPORTED CASES OF RABIES IN ANIMALS IN THE AMERICAS 1958

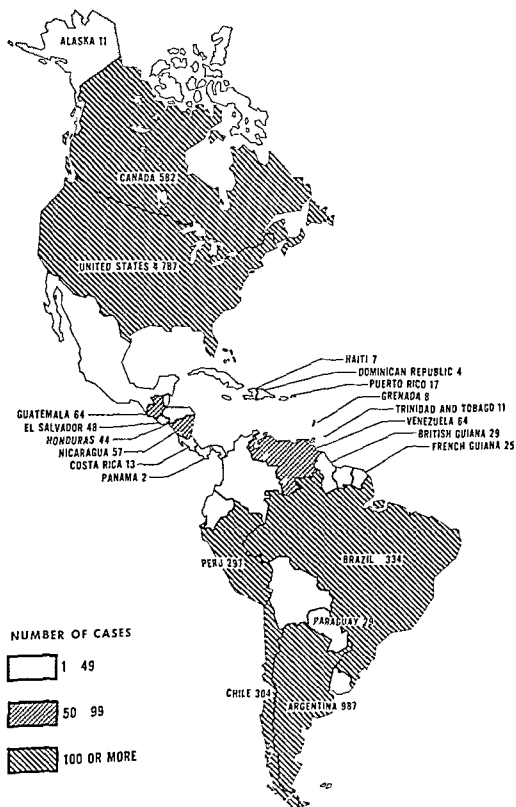
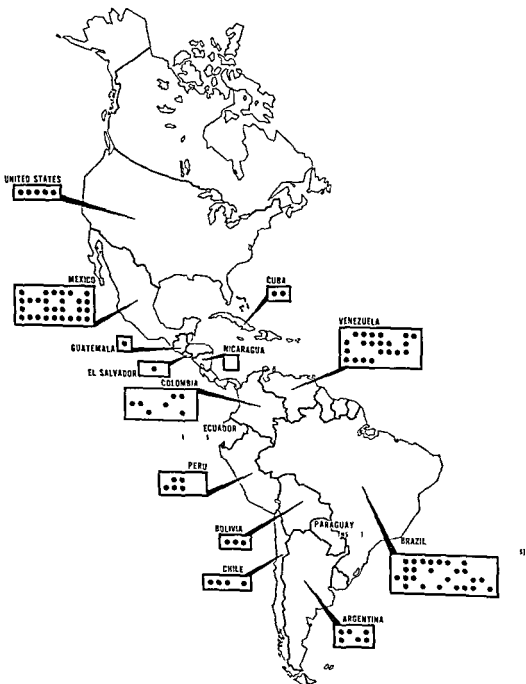


FIG 2 REPORTED CASES OF RABIES IN HUMANS IN THE AMERICAS 1958



Increasing attention is being paid to zoonoses by the countries of the Americas and by PAHO which is concerned in particular with brucellosis hydatidosis rabies and tuberculosis. One result of this was the establishment in 1956 of the Pan American Zoonoses Center in Azul Argentina¹. Efforts are now being made by PAHO to assemble all the available data on certain of the most important zoonoses occurring in the Region since organized reporting of morbidity from these diseases both in man and in animals is essential for the development of successful programmes against them. Organized reporting was recommended by the Advisory Group on Veterinary Public Health convened by the WHO Regional Office for Europe in 1955 and the Joint WHO/FAO Expert Committee on Zoonoses².

National health and agricultural services in the Americas have therefore been asked by PAHO to indicate the numbers of known cases of zoonoses in animal populations in the years 1956 1957 and 1958. Forms for recording the number of cases the type of disease and the type of animal have been distributed through the Zone Offices. It is hoped that this step will stimulate improved reporting in the field of zoonoses and the tabulation and analysis of data that will be valuable in future control programmes.

Before these data were asked for rabies was the only disease for which some information regarding cases in animals in the Region was available these cases were however reported from only seven areas. Information has now been received for 1958 for 22 areas in which 7724 cases of rabies in animals were diagnosed and reported (see Fig. 1). In six countries—Argentina Brazil Canada Chile Peru and the USA—more than 100 cases were reported and in Guatemala Nicaragua and Venezuela more than 50. Although no figures were provided for Mexico information received by the WHO Expert Committee on Rabies indicated that in 1958 747 captured animals in the Federal District had the disease likewise 81 cases were reported by

the National Institute of Hygiene of Ecuador. Rabies is most frequently found in dogs and cows though it is also reported to be transmitted by bats in a number of areas including Brazil Mexico the USA French Guiana and Trinidad.

Fig. 2 shows the distribution of the human cases of rabies reported in 1958 these numbered 176. In Brazil Colombia Mexico Peru and Venezuela 10 or more cases were reported in some of these countries the number of cases and deaths is sufficiently large to be a serious problem. Cases of rabies are usually reported only when patients have been given medical attention and a laboratory diagnosis made. No reports of human cases were received from Ecuador and Paraguay but vital statistics data revealed that 11 rabies deaths had been reported in Ecuador in 1957 and 5 in Paraguay in 1956. Rabies in man or animals does not occur in Uruguay the last case in man was reported in 1947 and the last case in an animal in 1949.

A comparison between the two maps shows that data on rabies in animals are lacking in several areas where more than 10 human cases were reported in 1958. Improved reporting is essential so that loss of human lives economic losses in cattle and the burden of Pasteur treatment may be reduced through a better understanding of the problem.

In addition to data on rabies reports have been received on cases of anthrax brucellosis and hydatid disease in man and in animals. Though incomplete the data (see table) are sufficient to show the usefulness of combining reports of human and animal cases.

Large numbers of cases of hydatid disease in animals were reported in Argentina and Chile. For example the 1958 figures in Chile were 101 915 cases in animals 123 cases in man and 44 deaths in man. As slaughter houses were the source of the figure for cases in animals it probably represents only part of the actual number. Though the number of human cases is small the high proportion of deaths shows that the disease is a veterinary health problem warranting preventive measures.

Although bovine tuberculosis is an eradicable disease and campaigns against it are

¹ See Ch. on Wild Hk O z 1957 11 348

² Wild Hk O z 1 An R p 5 1956 111

Wild Hk O z 1 An R p 5 1959 169

**REPORTED CASES OF SELECTED ZOONoses IN MAN AND ANIMALS
IN THE AMERICAS 1956-1958**

Disease	1956		1957		1958	
	M	Am	Y	Am S	Y	Am
Athax						
Arg t	2-4	1795	1	1100	131	1395
Bol	20					
Briz t	5	31	—	1	—	9
Ca d	—	3	—	—	1	1
Chl	32	105	32	171	4	1275
Col mb	38 ^b		8 ^b		9 ^b	
Cst R	8	(42)	0	(70)	15	(33)
El Salvador		9		14		7
G m		2		13		3
H t	5					
H d		12		38		42
M c	111		13		148	
N g	1	19		34		12
Pa m	1	—		—	—	—
P ru	36 ^b		3 ^b		75 ^b	
U t d St	38	(77) ^d	25	(84) ^d	16	(801) ^d
Ur u	43					
V	48 ^b	39	45 ^b	700	79 ^b	62
Brit h G na	—	—	—	1	—	—
Pu rt R	—	10	—	37	—	9
Bru II						
A g t	3398	1200	2741	293	2747	53
Braz I	6	25		99	2	18
Ca d	14		20		113	
Chl	9				5	
Col mb			6		12	
Co ta R	9	335	6	1042	3	599
C b	1					
El Salvador	6	922	6	831	8 ^b	6
G t mal		75		834		347
H d ra		62		84		72
H	28		92		1223	
N rag		—		824		749
P m	1	—	2	4	2	22
P ru	639	906	830 ^b	253	22	34
U t d S t	1300	30979	953	2167	974	241903
V	7 ^b		6		19 ^b	
Al	—	6	—	1	1	3
Brit h H d ra	—	1	—	—	—	—
F h G	—	—	—	—	—	—
H	1	—	—	—	1	69

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**REPORTED CASES OF SELECTED ZOOSES IN MAN AND ANIMALS
IN THE AMERICAS 1956-1958 (cont)**

Disease and area	1956		1957		1958	
	Man	Animals	Man	Animals	Man	Animals
Brucellosis (cont)						
Jamaica	—	22	—	36	—	8
Netherlands Antilles	—	1	—	2	—	1
Puerto Rico	3	2 241	—	2 408	1	1 503
Virgin Islands (USA)	—	—	—	117	—	42
Hydatid disease						
Argentina	149	373 008	126	318 063	143	447 807
Chile	122	8 709	115	111 082	123	101 915
Costa Rica	—	15	—	23	—	15
El Salvador	— ^b	—	— ^b	32	— ^b	18
Guatemala	—	3 8	—	272	—	130
Honduras	—	—	—	64	—	67
Peru	40 ^b	—	78 ^b	—	59 ^b	—
Uruguay	45	—	61	—	65	—
Jamaica	—	60	—	62	—	53
Rabies						
Argentina	16	1 217	13	833	8	987
Bolivia	—	—	—	—	3	—
Brazil	28	100	33	342	48	334
Canada	—	180	—	179	—	082
Chile	4	080	2	197	5	304
Colombia	13 ^b	—	33 ^b	—	23 ^b	—
Costa Rica	—	2	2	39	—	13
Cuba	—	—	2	—	2	—
Dominican Republic	—	3	—	2	—	4
El Salvador	4 ^b	31	2	83	3 ^b	48
Guatemala	2	67	4	53	1	60
Haiti	—	2	—	9	—	7
Honduras	—	48	1	46	—	44
Mexico	31	—	23	—	36	—
Nicaragua	—	1	3	—	1	57
Panama	—	—	—	2	—	2
Paraguay	—	42	1 ^b	75	—	29
Peru	15 ^b	213	6 ^b	300	10 ^b	797
United States	10 ^f	5 631	5 ^f	4 54	5	4 787
Venezuela	1	25	11	11	31	64
Alaska	—	15	—	4	—	11
British Guiana	—	8	—	27	—	27
French Guiana	—	—	—	—	—	17
Puerto Rico	—	23	—	23	—	11
Trinidad and Tobago	—	3	—	3	—	—
Windward Islands	—	—	—	—	—	—
Grenada	—	—	—	4	—	8

^a Federal District and State capitals except Mexico 1957 and 1958 ^b Reporting area ^f Reported deaths
Data not available Disease not notifiable — No case

being carried out in a number of countries it is still present in all but two areas for which information is available. In 1958 18 areas reported the finding of positive reactors.

The information given in the table on four zoonoses in man and animals together with information on five other zoonoses in animals will shortly be published by the Pan American Sanitary Bureau which acts as the WHO

Regional Office for the Americas in a report on cases of notifiable diseases in the Americas between 1949 and 1958. This publication⁴ will appear both in English and in Spanish and will be distributed widely to health officials in the Region.

Pan American Sanitary Bureau (1960) Report of case of notifiable disease in the Americas 1949-1958 (Scientific Publications, N. 43) Washington, D.C. (1 ptes.)

Reports of Expert Groups

Venereal infections and treponematoses*

The simplified therapy using sulfonamides and antibiotics now available for venereal infections and treponematoses continues both to solve problems and to raise others. The treatment of venereal disease in seafarers is still governed by the Brussels Agreement of 1924 the mere fact—among others—that shipboard treatment is now practicable also on vessels without a doctor calls for a fresh examination of the workings of this Agreement. Treponematoses endemic in many countries have been attacked through mass campaigns and programmes of eradication are now being planned for which the training of auxiliary workers and their teachers is of great importance.

The success of penicillin in treating yaws and syphilis has not been paralleled in gonorrhoea and the risk of increased allergic reactions which seems likely to result from the widespread use and misuse of this drug is giving cause for concern. An evaluation of other drugs for treating these infections is thus of immediate interest. Recent developments in serological standardization and methodology have implications for public health authorities, physicians and scientists concerned with such infections. All these aspects of venereal disease control are con-

sidered in the recently published fifth report of the WHO Expert Committee on this subject.¹

The Committee was of the opinion that the health of seafarers could best be safeguarded by defining anew and periodically reviewing the technical implications of the Brussels Agreement to enable it to be administered with fuller understanding in the light of recent medical progress and by assessing its usefulness through a survey of its functioning in the principal sea and river ports of Member States of WHO through consultant studies and through yearly returns from governments adhering to the Agreement.

Reviewing venereal infections ten years after the introduction of penicillin the Committee pointed out that these are by no means dying diseases. Although there has been a spectacular decline in the incidence of early syphilis in many countries it is still quite common in towns and seaport areas of Asia and South America and ranks fourth among notifiable diseases in the United States of America. Intensified efforts against syphilis are particularly necessary in Africa where it is feared that the disease may spread into the

WHO Expert Committee on Venereal Infections and Treponematoses (1960) Fifth report of the Health Organization. Ser. No. 190. 73 pages. Price 3/6, \$0.60 Sw. fr. 2.—Also published in French and Spanish.

Members of the Committee: D. W. J. Brown, USA; Professor G. A. Canaperia, Ital. (Chairman); Professor E. L. G. n., Yugoslavia; Dr. F. Nery Guimarães, Brazil; Dr. G. L. M. M. Elliott, United Kingdom; Dr. L. M. Ram, Singapore (Appointeur); Professor J. Towpik, Poland; Dr. R. W. Suto, Indonesia (Vice-Chairman); Secretary: Dr. T. Guthe, WHO (Secretary); Dr. C. J. Hackel, WHO.

rural tropical areas where yaws is being eradicated (see below). Gonorrhoea presents a more stubborn problem in 15 countries there has been a rise in the number of reported cases while in the United States of America it is estimated that the incidence is five to ten times higher than is actually reported. The Committee felt that failure to control the disease must be attributed to difficulties in defining the reservoir of infection in diagnosis and in treatment and management—the last largely due to the lessened sensitivity of the gonococcus to penicillin. Several reasons were advanced to explain why gonorrhoea and syphilis are not declining *pari passu*, and various possible measures for improving gonorrhoea control were examined. One of the most useful of these appears to be a promising technique for fluorescent antibody identification. The need for establishing an International Gonococcus Reference Laboratory was confirmed and recommendations were made for further research. It was felt that streptomycin offers the most useful alternative treatment where penicillin fails.

The Committee then noted the great progress that has been made in the eradication of endemic treponematoses from high prevalence areas. The campaigns of mass treatment undertaken during the past decade have been eminently successful. In Bosnia it is considered that complete eradication of syphilis has been achieved, no new active case of endemic syphilis having been found for five years. Indonesia, Nigeria and Haiti are examples of the many areas where yaws is receding as a result of treatment campaigns using PAM and in many parts of the world its prevalence is decreasing probably because of the improvement in standards of living. Where the prevalence of endemic treponematoses has recently been high or is so still there is little or no venereal syphilis and experimental studies with *T. pertenue* followed by *T. pallidum* in animals and man support the existence of cross immunity after 6-12 months. There thus appears to be a risk of the introduction of venereal syphilis into rural populations among whom yaws has been eradicated or at least greatly reduced.

by national mass campaigns. The Committee therefore recommended that there should be no delay by health administrations in extending the campaign for the world wide eradication of yaws and endemic syphilis and that the prevalence of venereal syphilis in towns and rural areas should be urgently ascertained so that the necessary public health measures may be taken in time.

The report next deals with the problem of the side effects of penicillin. The known total deaths from this antibiotic are some 90-115 yearly in the world but there are undoubtedly more and the mechanism of serious reactions to penicillin suggests that there may be an increasing number of reactors in the future. This fact may well prejudice the smooth development of venereal syphilis control programmes and perhaps also of eradication campaigns based on the use of penicillin. Available information indicates that sensitivity to penicillin can be induced by any penicillin salt or preparation by any mode and route of administration and probably by any dosage however small while repeated small dosages are apparently more sensitizing than a few large ones. The incidence of reactions seems moreover to increase with age. Nor is the therapeutic and prophylactic administration of the drug the only source of sensitization which may arise as an occupational hazard (e.g. among medical personnel and workers in drug manufacturers) or through hidden contacts (e.g. milk from cattle treated with penicillin for mastitis, virus vaccines, penicillin-contaminated syringes and inhalation or contact with penicillin-contaminated dust). The Committee made detailed recommendations for the prevention of such reactions through restriction of use of the drug and through research on the nature of sensitizing reactions and on the determination of latent sensitivity. Suggestions were made for an exploration by manufacturers, WHO and national health administrations of drugs alternative to penicillin for use against the treponematoses.

The progress of WHO activities in the fields of international standardization and of

the serological and laboratory aspects of venereal infections is outlined with particular reference to PAM benzathine penicillin cardioliipin lecithin and human syphilitic serum. Previous suggestions for research are summarized and further proposals are made for studies of the treponeme itself of the

epidemiological pathologic diagnostic aspects for long serological surveys aimed at results of campaigns and for the furnishing of venereal disease and health education to those age groups of particular risk of infection.

Vaccination programmes *

Thanks to vaccination fewer persons now suffer or die from such diseases as diphtheria poliomyelitis and tuberculosis. If immunization programmes using the best available vaccines were more generally applied the risk of infection from certain diseases could be still further reduced. Some of the problems raised by vaccination procedures are discussed in a recently published report of a European Technical Conference on the Control of Infectious Diseases through Vaccination Programmes¹. The report gives a broad picture of the legislation in force regarding vaccination in Europe. The degree of compulsion varies considerably from one country to another: many use a mixed system in which some vaccinations are compulsory, others not; and the general tendency is to substitute effective health education for compulsion by law. Very important are inspection and the recording of vaccinations which make it possible to obtain reliable data regarding their effectiveness. Generally the cost of vaccination programmes is borne by the health authorities; in some cases the cost has to be met by the patient himself which may adversely affect the success of the campaign.

The report assesses briefly the value of the most important vaccines and describes the present state of vaccination with them. Although smallpox does not exist as an endemic disease in European countries it was generally felt that it was still necessary to maintain a relatively high level of immunity in the population through continued vaccination programmes. It was agreed that BCG vaccination should be considered as part of the over-all tuberculosis control programme of any country. The report discusses the two types of anti-polio vaccines used at present: inactivated virus vaccine and attenuated live virus vaccine which has been successfully applied in the Soviet Union to more than 12 million persons. The use of triple vaccine against diphtheria, tetanus and pertussis is recommended and consideration is given to the suitability and effectiveness of many other vaccines such as those against influenza, typhoid, paratyphoid, tularaemia, brucellosis, rabies, etc., as well as those used against quarantinable diseases (yellow fever, typhus and cholera).

After dealing with the risks and techniques of different vaccinations, the report discusses the importance they may have in the control of infectious diseases and finally suggests models for programmes which, in the opinion of the Conference, might be adopted in the various countries according to the degree of development of their health services and their own particular problems.

¹ European Technical Conference on the Control of Infectious Diseases through Vaccination Programmes (1960). Report (14th Int. Org. An. Rep. Ser. N. 19). Geneva, 21 pages. Price 19.30 Sw. f. 1.

* Based on some of the papers presented at the conference, published in WHO Chron. 1960, 14: 131.

Notes and News

Diarrhoea caused by *Escherichia coli*

During the last fifteen years cases of diarrhoea have been observed in the newborn that appear to be due to strains of *Escherichia coli*. In spite of the evidence however some eminently qualified physicians and public health experts still do not acknowledge the existence of a relationship between these organisms and diarrhoea in young children.

As early as 1920 a strain of *E. coli* had been described in Germany that was suspected of causing an epidemic of diarrhoea in newborn children. But no satisfactory method existed in the identification of the *E. coli* group whereby the likely pathogens could be distinguished from the harmless strains: the concept of a causal relation was therefore not followed up although research workers did from time to time claim that it existed. It was only some thirty years later that serological typing of *E. coli* by highly specific sera enabled the strains incriminated to be identified: the serological group O for example which includes Bray's *E. coli* var. *napolitana* Giles & Smith's alpha type and Taylor's D-433. This group has an O antigen designated by the figure 111 and a capsular antigen called B₄ and is represented by the serological formula 0 111 B₄. Another group (0 55 B₅) has been isolated from infants with diarrhoea in various parts of the world. A third group (0 127 B₅) is also associated with epidemics in infants. As well as being related serologically these strains have common biochemical characteristics: are found in almost pure culture in the stools of infants suffering from diarrhoea and are isolated only in exceptional cases from healthy children living in the same surroundings.

In a recent article¹ in the Boletín of the Pan American Sanitary Bureau which acts as the WHO Regional Office for the Americas Dr F. J. Payne reports on his observations of five epidemics

over the past six years. Two of these epidemics were associated with *E. coli* 0 55 B₅, two others with 0 111 B₄ and the last with 0 127 B₅. Apart from these three groups 8 or 9 others appear to be probable or possible pathogens. In a series of 474 cases of acute diarrhoea in children of less than 2 years of age at Phoenix, Arizona, association with *E. coli* was shown in 25% and with *Shigella* in another 25%. The serological types of *E. coli* mentioned were found in 40% of 98 children in this series. About half of the infections of the children in this age group were due to groups 0 111 and 0 55.

The epidemiology of this kind of infection is still very obscure. There is a single instance where the origin of an epidemic could be attributed to a child suffering from a severe attack of diarrhoea who was brought into a general paediatric ward. Outside hospital the study of contacts has borne little fruit. Only 12.4% of 244 contacts of all ages were carriers of *E. coli* (all the types being counted). Only in rare instances has other than the same type been found in the patient and in his contacts.

It is essential therefore to seek the sources and mode of infection by *E. coli*. It is not even known if the health measures taken against other organisms causing diarrhoea in infants are effective against pathogenic *E. coli*. What is known however is that infection with *E. coli* does not confer immunity: on the contrary it tends to recur.

Live poliovirus vaccines

The Second International Conference on Live Poliovirus Vaccines was held in Washington D.C. from 6 to 11 June 1960 under the auspices of WHO and the Pan American Health Organization with the financial assistance of the Sister Elizabeth Kenny Foundation of Minneapolis, Minnesota.

Since the first conference on this subject was held in June 1959¹ numerous field trials and

vaccination campaigns with live poliovirus vaccines have taken place under very varied conditions and there have been extensive laboratory investigations on the properties of the attenuated poliovirus used in oral vaccines and on the properties of the poliovirus excreted by vaccinated persons

The second conference gave scientists from 20 countries an opportunity to review the results of these investigations and to discuss the public health aspects of the use of live poliovirus vaccines. Points discussed included laboratory evidence of attenuation and safety, field evidence of safety, spread of attenuated poliovirus, the immunization of special groups (premature and newborn babies, pregnant women and persons receiving medical or surgical treatment), evidence of effectiveness in man, possibilities of eradicating poliomyelitis.

Expert Committee on Poliomyelitis

The WHO Expert Committee on Poliomyelitis met in Washington, D.C. from 13 to 16 June 1960 immediately after the Second International Conference on Live Poliovirus Vaccines. Each of the participants was an expert in at least one of the following fields: virology, immunology, epidemiology, statistics, biological controls, public health aspects of mass immunization programmes.

The main purpose of the meeting was to review the present position of the control of poliomyelitis through vaccination and to advise on future action. The recommendations contained in the second report of the Expert Committee on Poliomyelitis were reviewed in the light of more recent data. The results achieved so far with both inactivated and live attenuated vaccines under different epidemiological conditions were considered and special attention was given to the public health aspects of their mass administration. The question of the safety and effectiveness of the recently developed live attenuated vaccines and criteria for the selection of the strains to be incorporated in them received special consideration.

An account of the Committee's work will be published in the *Chronicle* when its report appears.

The teaching of psychiatry

The WHO Expert Committee on Mental Health met in Geneva from 13 to 18 June 1960 to discuss the teaching of psychiatry and of mental health promotion to medical students.

The importance and emphasis given to the undergraduate teaching of psychiatry vary greatly from country to country. In some medical schools this subject does not appear on the curriculum; in others it occupies nearly 700 hours of teaching time. In one school, 83% of the psychiatric teaching time is devoted to the psychoses while another devotes only 1% of this time to this aspect of the subject. In some countries psychiatric teaching is mainly in the form of academic lectures; in others the emphasis is on practical work.

The Committee sought to establish the aims of the undergraduate teaching of psychiatry, the content and method of this teaching, the staff requirements and the possible role of WHO in this field. In its discussions it took into account the differences in psychiatric needs in different countries as determined by cultural background, social structure and economic development.

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Study tours in Bulgaria, France and Czechoslovakia

Two study tours for public health administrators from European countries were organized by the WHO Regional Office for Europe in May and June.

During the first of these tours, which was concerned with rural health administration, a group of doctors from France (Algiers), Greece, Poland, Spain, Turkey and Yugoslavia visited Bulgaria and France. The tour lasted from 4 May to 4 June and started in Sofia where the groups studied the basic concepts of public health in the

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People and Places

Control of onchocerciasis vectors

An investigation into difficulties experienced in the control of *Simulium* (blackflies) the vectors of onchocerciasis in countries of the African Region is to be carried out by WHO. Dr A. W. A. Brown has been appointed by the Organization to visit the countries concerned and his report on the situation will serve as a basis for future research. Now Head of the Department of Zoology, University of Western Ontario, Canada, Dr Brown was Biologist in the Division of Environmental Sanitation, WHO Headquarters, from 1956 to 1958.

Sanitary engineering

Dr Vicente M. Witt of Ecuador has been appointed WHO Professor of Sanitary Engineering (Chemistry) at the University of Madras, India. In this capacity he will advise on the further development, organization and planning of a course in sanitary chemistry, bacteriology and biology.

Dr Witt, who graduated as a Civil Engineer from the Universidad Central, Quito, Ecuador, in 1948, holds M.S. and Ph.D. degrees in sanitary engineering and had been engaged for several years in research work at the University of Michigan, Ann Arbor, USA.

Protozoal diseases

In 1958 the Sixth International Congress of Tropical Medicine and Malaria recommended that WHO should help in the elucidation of problems connected with leishmaniasis and amoebiasis. Dr P. C. C. Garnham recently spent a month in Geneva advising WHO on these problems and also on problems connected with toxoplasmosis and trypanosomiasis. Dr Garnham is Professor of Medical Protozoology at the London School of Hygiene and Tropical Medicine and has studied protozoal diseases in Africa and Latin America.

Health problems of seafarers

WHO is at present undertaking a study of the nature and extent of the health problems of

seafarers and of the health services available to them. Dr A. Hutchison of the United Kingdom has been appointed consultant for this study with the task of examining the answers to a questionnaire on the subject circulated by WHO to all Member States, personally assessing the situation in fifteen ports in countries at various stages of development and preparing a report indicating further ways and means whereby health services can be provided to seafarers of all nationalities on a wider scale.

Dr Hutchison, who is at present Medical Officer of Health for the City of Kingston upon Hull, has wide experience of the health problems of seafarers, having served as Port Medical Officer and Medical Inspector for the Hull and Goole Port Health Authority and Divisional Medical Officer and Port Boarding Medical Officer for the City of Glasgow.

Bilharziasis control in Iraq

Dr Rafael A. Torrico has been appointed by the WHO Regional Office for the Eastern Mediterranean as team leader to the bilharziasis control project in Iraq. A former chief of Parasitology and Tropical Diseases in the Institute of Regional Medicine of the University of North West Argentina, Dr Torrico also served as Director of the Laboratory of Inter American Co-operative Health Services in Cochabamba, Bolivia, for thirteen years and as Professor of Parasitology and Tropical Medicine at the University of San Simon, Cochabamba.

Virology research and reference centre

Dr Ulrich Krech of the University of Berne, Switzerland, has been appointed by WHO to advise the Philippines Department of Health on the establishment of a virology research and reference centre. Among the more common virus diseases in the Philippines are rabies, haemorrhagic fever, measles, influenza, some forms of pneumonia, the common cold, encephalitis, chickenpox, and mumps. The proposed virology centre is expected to reduce mortality through the

Bulgarian People's Republic health administration and the training of health personnel before going on to visit rural health installations in Timovo Varna and Plovdiv. A similar programme was arranged in France where the tour started at the National School of Public Health Paris and rural health services in the Soissons Nîmes Limoges and Orleans areas were visited.

The subject of the second tour which took place in Czechoslovakia from 23 May to 11 June was occupational health. The first four days were spent in Prague where the participants were given talks on the structure of health services social security schemes the organization of occupational health services and programmes of research in Czechoslovakia. The rest of the time was spent studying occupational health and public health services in different parts of the country with visits to institutions and industrial concerns. The participants in this tour were doctors from Austria Belgium Bulgaria Denmark Finland France Germany Greece Ireland Italy the Netherlands Norway Poland Spain Sweden Switzerland Turkey the United Kingdom the USSR and Yugoslavia.

Pathogenesis of essential hypertension

A Symposium on the Pathogenesis of Essential Hypertension was held in Prague Czechoslovakia from 23 to 28 May 1960 under the joint auspices of the Czechoslovak Cardiological Society and the WHO Regional Office for Europe. Some forty outstanding scientists in the fields of cardiology physiology and pathology were invited to take part.

Although essential hypertension is a widespread condition and a frequent cause of premature invalidity and death there is little agreement about its pathogenesis or about the role of various environmental factors. This situation makes any rational attempt at prevention impossible. The aim of the Symposium was to try through discussion and criticism to clear up the differences between various current concepts. The subject was dealt with under the following main headings: essential hypertension as a nosological entity and its natural history epidemiology the central

nervous system and essential hypertension haemodynamics of essential hypertension vessel wall factors and metabolic factors.

The urgent need for large scale studies of the problem supported and co-ordinated by WHO was stressed and recommendations were made on the most promising avenues of research.

Tuberculosis seminar

A seminar on tuberculosis was held by WHO in co-operation with the Government of Australia and the National Association for the Prevention of Tuberculosis in Australia, in Sydney Australia from 23 May to 3 June 1960. The participants were mainly from the Western Pacific Region but the Eastern Mediterranean and South East Asia Regions were also represented. The principal subjects of discussion were measurement of the extent of the tuberculosis problem in a country tuberculin testing and BCG vaccination case finding the chemoprophylaxis of tuberculosis the antimicrobial therapy of pulmonary tuberculosis planning organization and evaluation of tuberculosis control programmes the role of WHO in the world tuberculosis programme.

Education in nutrition

A seminar on education and training in nutrition sponsored by WHO FAO and UNICEF was held in Rio de Janeiro Brazil from 15 to 24 June 1960. Its aim was to examine the channels methods and techniques used for nutrition education in South American countries. Items on the agenda included the social cultural and economic aspects of food habits ways of learning and teaching approaches suitable for education in nutrition nutrition education in schools families and communities training in nutrition at university level evaluation of education programmes in nutrition.

The 50 participants in the seminar included senior staff from health education and agriculture services in Argentina Bolivia Brazil Chile Colombia Ecuador Paraguay Peru Uruguay and Venezuela.

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WORLD HEALTH ORGANIZATION

early diagnosis of this type of disease. It will also serve as a training centre for Filipino virologists.

Before joining the staff of the University of Berne, Dr Krech was Chief of the Virus Department of the Swiss Serum Institute. He obtained his medical degree at the University of Marburg/Lahn, Federal Republic of Germany, and has done post graduate research on virology in Germany and the USA.

Nurse educator for Laos

Miss Phyllis D Aldridge of the United Kingdom has been appointed senior WHO nurse educator in the maternal and child health programme in the Kingdom of Laos. On this

assignment she will work with Dr M P D Martin, a WHO medical officer who went to Laos last year to survey the country's health needs and problems and to help the Government plan adequate health services for mothers and children. Dr Martin and Miss Aldridge will also establish training programmes for Lao personnel concerned with maternal and child health work.

Miss Aldridge did her nursing and midwifery training in London and Edinburgh and studied nursing administration at the Royal College of Nursing, London. She has served as nursing sister for Bournemouth Health Department, England, and as assistant matron for the Board of Health, Nassau, Bahamas.

CORRIGENDUM

Vol 13 No 12

PEOPLE AND PLACES

p 462 right hand column item headed *Malariaologist for Turkey* last line

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Endemic Goitre

Two years ago an article was published in the *Chronicle* entitled "Endemic goitre a public health anachronism" ¹ This article was based on a series of six contributions to a special number of the *WHO Bulletin* ² Revised and brought up to date by their authors these have now been republished together with six new chapters in the *WHO Monograph Series* ³ The resulting publication provides a comprehensive review of the subject covering the history prevalence geographical distribution health significance and etiology of endemic goitre the physiology and pathological anatomy of the thyroid gland and various aspects of endemic goitre control

WHO's interest in endemic goitre dates back to 1950 when the Third World Health Assembly recommended that the Organization undertake a study of endemic goitre and encourage governments to investigate the problem within their territories A WHO study group on the subject was convened in 1952 and its report published in a special number of the *Bulletin* ⁴ together with several original studies on goitre contained specific recommendations regarding the technique to be used in surveys methods of iodinating salt and areas for further research These recommendations were amplified the following year by the Third Conference on Nutrition Problems in Latin America held in Caracas under the joint sponsorship of FAO and WHO The situation was reviewed by the FAO/WHO Fourth Conference on Nutrition Problems in Latin America meeting in Guatemala in 1957 this conference particularly emphasized the need for implementing the legislation adopted by various countries requiring iodination of all salt for human consumption

With the aim of providing more direct assistance to governments a number of WHO consultants have been despatched to various regions to study the problems of endemic goitre on the spot and to give advice on the measures to be taken Two such missions were undertaken as early as 1950 one by Dr O P Kimball who visited nine Latin American countries the other by Dr Dagmar Wilson in Ceylon A survey of practically the whole of Latin America was conducted by Dr J Gongora and Mr J C M Holman in 1954 and in 1955 Dr V Ramalingaswami examined the nutrition situation in Thailand The most recent project was a prevalence survey of endemic goitre in Basutoland undertaken by Dr J A Munro in 1957-58 WHO has also been instrumental in stimulating research on problems connected with the iodination of salt and has co-operated with UNICEF in the provision of aid to countries wishing to institute programmes of iodine prophylaxis

The monograph on endemic goitre just published forms WHO's latest contribution to the study of goitre control It is hoped that it will not only serve as a work of reference for all those interested in the problem but will also encourage the adoption of active measures in those countries where endemic goitre still remains a public health anachronism

Chron. Wld Hlth Org. 19: 8: 12, 179

Bull. Wld Hlth Org. 19: 8: 18, 1, 271

Endemic goitre (World Health Organization Monograph Series N. 44), 1960, Geneva. In the articles that follow this monograph is referred to in footnotes as "the monograph".

Bull. Wld Hlth Org. 1953, 9: 171, 309

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

PRINTED IN SWITZERLAND

WORLD DISTRIBUTION OF ENDEMIC GOITRE

Goitre occurs with varying intensity in almost every country. The disease has been observed in the far north and in the tropics and in the far south. It occurs independently of climate as shown by the fact that endemic goitre makes no distinction of race or nationality. It is found in all classes of the North American, the European, the Chinese, the Malay, the Indian, the Turk, and the peoples of Central and South America all suffer from it under certain conditions—some severely, some moderately, some mildly.

KELLY & SNEDDEN

Iodine prophylaxis and rising standards of living have made possible the near eradication of endemic goitre in a number of countries that were formerly severely affected. Nevertheless the world distribution of endemic goitre has not changed appreciably over the last hundred years and in many countries the prevalence is still very high. From the incomplete statistics at present available Kelly & Snedden estimate that the total number of goitrous people in the world must be not far short of 200 million. Statistics for 1952 showed that in eight states of Mexico alone there were more than 2 million goitrous people out of a total population of about 10 million and in El Salvador with a population of less than 2 million 329 000 people were affected. It has been estimated that there are 9 million cases of goitre in India, 5 million in Italy and 1.4 million in Yugoslavia. A map showing the distribution of endemic goitre in various areas of the world appears on page 338. It should be noted that it indicates only where goitre has been found and gives no indication of its severity.

In general the areas of endemic goitre tend to follow the mountain ranges—for example the Alps, the Pyrenees, the Himalayas and the Andes. On the other hand there are also some low lying areas such as the basin of the Great Lakes between Canada and the USA, the plains of Lombardy, the Netherlands and parts of Finland. It has

been suggested that all these areas have one thing in common—a low iodine content in the soil. The iodine has either been leached out by flooding or swept away with the topsoil by the action of glaciers. The iodine content of post-glacial soils generated by the grinding up of virgin rock is only about one tenth that of mature agricultural soils. Atmospheric iodine derived from the sea and carried inland by winds is brought down by rain and snow gradually enriching the soil but this is a slow process and hundreds of thousands of years are required to restore the iodine content to pre-glacial values. It is claimed that the distribution of goitre in North America and a number of countries of Europe, Asia and Australasia shows a close correlation with the areas affected by the last glacial period.

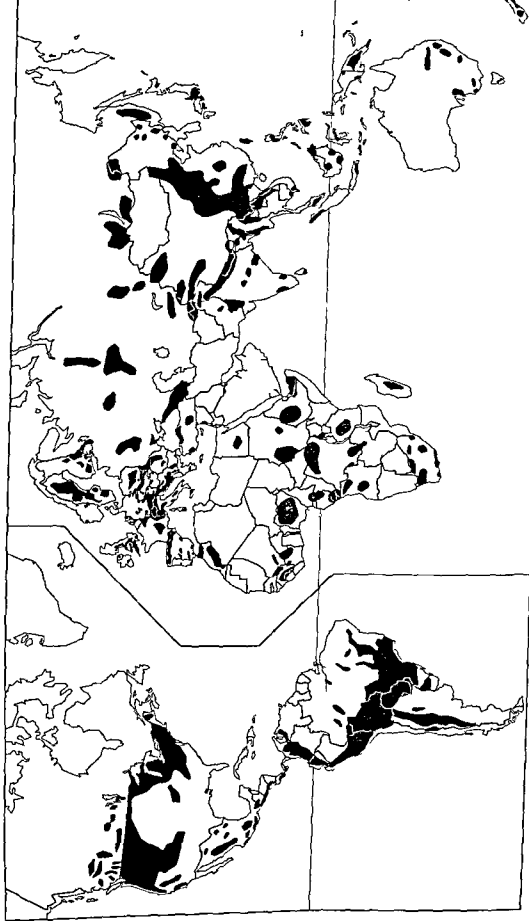
In a survey based on more than 1300 references Kelly & Snedden present a country-by-country analysis of the distribution of endemic goitre throughout the world which bears impressive testimony to the continued public health importance of the disease in many countries. In addition to a wealth of statistics on prevalence the survey includes much historical material and the authors also discuss the possible local causes of many of the endemics as well as the measures taken to combat them.

The Americas

The most notorious goitre areas in North America are around the Great Lakes and along the Appalachian range. Goitre is also

KELLY & SNEDDEN (1960). Prevalence and geographical distribution of endemic goitre. In *Endemic goitre*. The chapter on the mountain basins of the present.

ENDEMIC GOITRE GEOGRAPHICAL DISTRIBUTION



coast and a small region in the north-east. Domestic animals are also affected. In 1954 the iodization of salt was made a legal requirement and production is gradually being increased. Severe foci of endemic goitre are found in the mountain regions of Romania and Bulgaria. In Romania the disease is associated with extreme poverty. There has been considerable improvement however following the institution of an anti goitre campaign in 1947—including mass prophylaxis with iodized salt—and similar measures are now planned in Bulgaria. Iodine prophylaxis has also been introduced with good results in Hungary and in Czechoslovakia where a number of careful studies on goitre have been carried out. The worst affected area is in the extreme east of Czechoslovakia where goitre prevalence has been correlated with a diet containing excessive quantities of cabbage.

The principal goitrous areas in western Europe apart from those already mentioned are in the north east of France near the Belgian and German frontiers, in southern France in the region of the Massif Central and in northern Spain extending from the Pyrenees through the Cordillera Cantabrica and the Asturias to Galicia. Goitre also occurs at a number of foci in southern and central Spain. The region of Las Hurdes in the north of the Province of Cáceres is one of the most notorious goitre centres in the world: not a single man from this district has been found fit for military service either because of low stature or marked feeble-mindedness. Portugal has a number of scattered foci of endemic goitre but none of exceptional severity. In Italy apart from the main Alpine belt already referred to, high prevalence rates are found in the Apennines at several places and there is a little known centre in the extreme south in the province of Catania. Goitre is also fairly common in the islands of Sicily and Sardinia. Of the remaining countries of western Europe the Netherlands is of interest because it is the only country where goitre prophylaxis with iodized water has been successfully applied for any length of time on a large scale: the results being comparable with those achieved

in other countries using iodized salt. Since the Second World War when the Germans stopped this form of prophylaxis the use of iodized salt in bread making has been made compulsory in affected areas—chiefly the eastern, central and southern parts of the country. This has resulted in a steady decrease in the prevalence of thyroid enlargement. Belgium is comparatively free from goitre although during the Second World War there was an increase in the prevalence of simple goitre accompanied by a decrease in thyrotoxicosis. This has been attributed to an increased consumption of cabbage and related vegetables. In the British Isles goitre prevalence has considerably diminished over the past hundred years with the rising standards of living but the most recent surveys show that it is still disquietingly high. The areas principally affected are the western half of England and Wales and a small area in south-east England. In 1944 the Goitre Subcommittee of the Medical Research Council of Great Britain estimated that there were 500,000 cases of thyroid enlargement in persons between 5 and 20 years of age and they urged the general introduction of iodized salt. Unfortunately this recommendation has not been implemented.

USSR and Asia

In the USSR as elsewhere most of the highly goitrous areas follow the mountain ranges—in the European part of the USSR, the Urals, the Carpathian mountains and the Caucasus; in the Asian part the Chatkal Mountains and the Pamir plateau, the Altai Mountains as well as the mountainous areas to the west and east of Lake Baikal and in the Maritime Territory to the north of Vladivostok. In most of these areas endemic goitre is severe and in some valleys of the Pamir plateau it is claimed that the entire population is goitrous. A vast amount of systematic research carried out throughout the USSR has given ample support to the iodine deficiency theory of the causation of endemic goitre and has also provided some evidence that a high content of manganese

prevalent in an area between the Rocky Mountains and the Pacific coast extending from the Cariboo Mountains in the north to Arizona in the south. The goitre situation in the Middle West has greatly improved in recent years following the introduction of iodized salt but there are still many places where the rates are disquietingly high. As recently as 1958 it was estimated that there are a million working men in the USA who have hypothyroidism of which neither they nor their physicians are aware.

A vast goitre zone begins in the upper basin of the Rio Grande del Norte in Mexico and extends down through the Central American republics into Colombia and Venezuela and along the Andes through Ecuador and Peru as far as Chile and western Argentina. The mid central states of Mexico are heavily affected and in some localities in the province of Oaxaca 80-90% of the population is goitrous. There is some evidence that goitre was present in parts of Central and South America hundreds if not thousands of years before these countries were conquered by the Spaniards but this is contested by Greenwald and others. At all events the disease is found today in almost every country of South America. Brazil is estimated to have 11 640 000 goitrous persons out of a population of roughly 62 000 000 and there are parts of Peru where the goitre rate is 90% and cretinism mental deficiency and deaf mutism are common. Goitre is also widely diffused throughout a 1500 mile strip of territory bordering the Cordillera in Argentina. On the other hand Chile and Uruguay are relatively free from the disease. Most of the South American republics are now taking energetic action to introduce iodine prophylaxis.

Europe

Northern Europe has relatively few goitrous areas. In Finland there are four goitre belts extending northwards from the Gulf of Finland into the central part of the country. A high frequency of nodular goitre is a feature of the endemic which is estimated to be responsible for 2000 operation cases

annually. Animal goitre is also common. A clear correlation between goitre prevalence and iodine deficiency in the diet has been demonstrated in Finland. Goitre is also widespread throughout most of Sweden affecting both man and animals. In Norway there are only localized foci but the rates are often very high in some places in Telemark it is claimed that they even reach 100%. Iceland has always been completely free from goitre. This is attributed to the high consumption of fish which is rich in iodine. Denmark is also relatively goitre free and so are the former Baltic States northern Poland and northern Germany. On the other hand practically the whole of southern Poland is goitrous and goitre is also endemic in central and eastern Poland. The highest rates are in the south particularly in Lower Silesia. The severity has increased since the Second World War. This has been attributed to the use of synthetic fertilizers in place of Chilean nitrate of soda which contains iodine.

In Germany goitre is found mainly in Westphalia Wurttemberg and southern Bavaria and in a strip roughly parallel to the Czechoslovakian border. The introduction of iodized salt in Bavaria in 1924 was followed by a marked decline in the goitre rate in schools. The practice was abandoned in 1930 for fear of harmful effects and 4 years later rates of over 70% were reported. A vast goitre area covers the whole Alpine region including practically all of Austria and Switzerland northern Italy and south eastern France. This region has long been notorious for the severity of endemic goitre and frequency of cretinism. With rising standards of living the goitre rates have gradually declined during the present century and in Switzerland especially where iodized salt has been in general use for more than thirty years the position is now greatly improved. This can be strikingly seen in the drop in the number of army recruits rejected on account of goitre and the reduction is greatest in the cantons where most iodized salt is used.

Goitre is a very serious problem in Yugoslavia practically the whole of which is goitrous with the exception of the Adriatic

coast and a small region in the north-east. Domestic animals are also affected. In 1954 the iodization of salt was made a legal requirement and production is gradually being increased. Severe foci of endemic goitre are found in the mountain regions of Romania and Bulgaria. In Romania the disease is associated with extreme poverty. There has been considerable improvement however following the institution of an anti goitre campaign in 1947—including mass prophylaxis with iodized salt—and similar measures are now planned in Bulgaria. Iodine prophylaxis has also been introduced with good results in Hungary and in Czechoslovakia where a number of careful studies on goitre have been carried out. The worst affected area is in the extreme east of Czechoslovakia where goitre prevalence has been correlated with a diet containing excessive quantities of cabbage.

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occasions a reduced content of iodine in the soil. Large scale programmes of prophylaxis with iodized salt have been instituted in almost every part of the USSR where goitre occurs and goitre rates have fallen considerably.

The endemic goitre area of the Pamir plateau referred to above merges into the classic goitre area of the Himalaya mountains described by Kelly & Snedden as the head quarters of goitre and cretinism on the continent of Asia. It extends through Kashmir, Nepal and Burma into China and neighbouring countries areas that have a goitre reputation more formidable perhaps than that of any other part of the world. In comparison with this vast northern area of endemicity which extends into northern Pakistan and the low lying plains of Uttar Pradesh in northern India goitre is not excessively acute elsewhere in India or Pakistan. The total number of goitrous persons in India was estimated at 5 million in 1917 (McCarrison) and at 9 million in 1959 with prevalence rates varying from around 10% in some places to 90% or more in others. Cretinism, deaf mutism and idiocy are very common. McCarrison produced experimental evidence that polluted drinking water is an important etiological factor at least in some parts of the Himalayas (see p. 350) and in Uttar Pradesh a correlation has been found between the distribution of goitre and the calcium content of soils and drinking water. Unbalanced diets associated with widespread poverty are thought to be an important contributory factor. Even though iodine deficiency may not be the primary cause of goitre in many parts of India it is generally believed that the easiest and cheapest way of preventing the disease is by giving supplementary iodine. The iodization of salt presents some difficulties owing to the poor quality of the salt and the climatic conditions. Efforts are being made to improve the quality of the salt and also to find a satisfactory method of iodizing the present grade with potassium iodate.

The highest goitre rates in Burma are seen in the Kachin Hills in the north and in the Shan States. The number of cretins and

deaf mutes is extremely high, rates of 10 per 1000 having been recorded among the Kachins. These people drink water heavily impregnated with lime and eat powdered lime in large quantities—possibly important causative factors. The Shan States area extends southwards into northern Thailand and the north west of Indo China and links up with the vast endemic area of mainland China. This begins near the Manchurian border in the north east of the country and follows a westward semicircular route across the mountainous watershed north of Peking afterwards continuing southwards into Yunnan, the most goitrous province of all China. The great plain of China and the coastal provinces are virtually free from simple goitre although toxic goitre is common. Some of the earliest accounts of endemic goitre relate to China and references have been cited showing that it was known there at least as early as the third century B.C. All travellers have been impressed by "the evidence of human misery and degradation due to goitre and cretinism". Iodine deficiency appears to be the principal cause of goitre in China, particularly in Yunnan province, but the hardness of the water may be an aggravating factor. An antigoitre campaign was organized in 1958 and prophylactic measures have been instituted in nearly all endemic areas, mainly with iodized salt but also with traditional iodine-containing drugs, iodized oil and potassium iodide. The results so far appear promising.

Goitre is common in the inland mountainous parts of Malaya and foci are scattered throughout the Indonesian archipelago. Kelly & Snedden relate the interesting case of the two villages of Lampoe and Tjatoer situated only a few hundred yards apart on the island of Bali. Tjatoer is inhabited by pure Balinese and goitre is common. Lampoe is a Chinese settlement and is free from goitre. The Balinese have a monotonous maize and rice diet and drink unboiled water from a goitrogenic spring, whereas the Chinese have a varied diet and boil their water before use. Prophylaxis with iodized salt was introduced in parts of Java in 1927 and extended to Sumatra in 1930. At that time an unusual

method of iodization had to be used because salt was manufactured in block form this involved pouring a solution of potassium iodide into a small hollow on the top of each brick and allowing it to spread throughout the brick by capillary action. Goitre is a serious problem in the jungle-clad hilly country of North Borneo where cretinism is common. Attempts to supply iodized salt to people of this area have not so far been very successful. In neighbouring Sarawak many of the people are protected from goitre by consumption of an iodine rich salt derived from natural salt springs in inland areas however where the people use imported salt goitre is common.

Thyroid disease appears to have been on the increase in recent years in the Philippine Islands and also in Taiwan and both areas exhibit severe endemic foci. On the other hand Japan appears to be relatively free from goitre. This has been ascribed by some to the widespread and regular habit of eating seaweed an amount equivalent to about 5 mg of iodine is often consumed by one person at a meal. Quite high goitre rates have been recorded however in several mountainous inland localities and some degree of thyroid enlargement was found in 61% of children at one school in the Japanese Alps.

Goitre is practically unknown in the countries of western Asia with the exception of a few endemic areas in Turkey and the Lebanon. Two foci have also been described in Iran.

Africa

Goitre would appear to have been endemic in North Africa for at least four or five hundred years since a number of accounts of the disease have been left by sixteenth century travellers to these parts. Greenwald maintains however that these earlier descriptions are unreliable and do not refer to goitre which in his view did not appear on the African continent until the nineteenth or even the twentieth century.

At the present time there are two principal goitre zones in the extreme north of Africa. One is in the neighbourhood of the Atlas

Mountains stretching across Morocco and northern Algeria where the Department of Constantine is particularly affected. The other is along the Nile valley and in the region of the Dakhla Oasis in Egypt. Iodine deficiency appears to be the main cause of these endemics although in Morocco it has been suggested that the cause is the high consumption of turnips. The Egyptian Nile valley foci have counterparts further south in the Sudan the two most important being to the north of Khartoum and to the south west of Malakal. There is also a narrow goitrous strip roughly 200 miles long and 60 miles wide in the south west of the Sudan where it borders on the Central African Republic and the former Belgian Congo. A puzzling feature is that the endemic zone ceases abruptly outside the confines of this narrow strip although the neighbouring territories have the same kind of terrain and climate and are inhabited by the same tribe subsisting on the same kind of diet. The strip is the watershed for innumerable small streams flowing northwards to the Nile and it has been suggested that the virgin streams are deficient in iodine but gradually become enriched from rotting vegetation or other sources after flowing 50-60 miles through a leached out sandy soil. It is hoped to make iodized salt generally available in the area.

There is an extensive area of endemic goitre covering the high plateau of Ethiopia the prevalence being higher on the west side than on the east. The disease appears to be confined almost entirely to women a circumstance that has been attributed to its mildness. From the data at present available goitre does not seem to constitute an important problem in British Somaliland, Uganda or Tanganyika. Farther west, in the former Belgian Congo however there are 4 important goitre zones. The largest is a strip 600 miles in length stretching across the north of the territory. It is believed that goitre first appeared in this area only towards the close of the last century and that the prevalence has since increased rapidly. A second endemic zone is found in the mountains around Lake Kivu and at the head of Lake Tanganyika in the north-east. In Ruanda

Urundi high goitre rates seem to be correlated with heavy rainfall. At Lokandu in the Maniema region goitre occurs predominantly in women and is associated with sterility. It is thought that an excessive secretion of the sex hormone folliculin may act as a goitrogenic agent. The mountainous parts of Katanga are also goitrous and there is a small focus south east of Leopoldville.

Two very interesting zones of endemic goitre have been studied by the French Colonial Service in former French Equatorial Africa. These are in Cameroun and in the neighbourhood of Koumra, Chad. The prevalence is high in both areas and very large goitres are often seen. In Cameroun endemicity appears to be most severe on granite soils and at the boundary between savanna and forest. The origin of goitre in Koumra has been ascribed to a parasitic infection prevalent in the area but other evidence suggests that it is a question of water supply. Attempts to introduce iodized salt in this area have so far been unsuccessful. An extensive goitre survey has been carried out under government auspices in former French West Africa and the goitrous zones have been carefully mapped out. Goitre is rare on the Atlantic seacoast and almost non-existent north of the 14th parallel. It has been suggested that the peoples living in the north of the territory are protected from goitre by the consumption of natural iodine containing salt whereas those south of the 14th parallel are dependent on a salt obtained by the incineration of local plant foods. Prophylactic trials with iodized salt have given highly promising results. The goitre belt in this part of Africa also extends into the territories of Gambia, Sierra Leone, Ghana and Nigeria through former French Equatorial Africa into northern Angola. The goitrous areas are all associated with pre-Cambrian granitic rocks which have been subjected to intense weathering and have had their iodine leached out. Analyses of water supplies have shown a definite correlation between the goitre rate and the iodine content of the water.

Goitre is endemic in the Central Province of Northern Rhodesia and apparently at

several places in Southern Rhodesia though there is little published information. The Caprivi Strip which lies between Angola and Bechuanaland and connects Northern Rhodesia with South West Africa forms part of a zone of high prevalence extending into South West Africa and Bechuanaland. Goitre rates of up to 70% have been recorded in some places and the disease is prevalent even among breast fed infants. In the Union of South Africa a narrow goitre belt stretches across the Transvaal from Zeeuws to Nelspruit and then curves south to occupy almost the whole of Swaziland. Goitre is also common throughout the Drakensberg area including the whole of Basutoland and neighbouring territories in the Orange Free State, Natal and Cape Province with rates ranging from 30% to 50%. The region between Prince Albert and Port Elizabeth in the extreme south is a well known goitre area and there are also endemic foci in the south east and north west of Cape Province. Investigations by the South African Goitre Research Committee have amply confirmed that iodine deficiency is the primary cause of endemic goitre in the Union and neighbouring countries but excessive quantities of fluorine in the drinking water in some areas and a high content of calcium in soils, waters and vegetation in others appear to be contributory factors. The introduction of iodized salt in all endemic areas except those where goitre is fluorine induced has been strongly recommended.

Australia and New Zealand

As far as is known at present goitre in Australia is confined to the south east of the country. Foci are found all along the Great Dividing Range from the Queensland border in the north down to Gippsland in Victoria in the south where the prevalence is comparatively high. Thyroid enlargement was found to be very common among school children in the Canberra area in a survey conducted in 1947 and iodine prophylaxis with potassium iodide tablets was instituted with excellent results. There is also an endemic goitre area in the Adelaide Hills in the state of South Australia. Practically the

whole of Tasmania is goitrous. Clements noted in 1949 that at least 20% of adult women had goitre and the death rate from thyrotoxicosis is also higher than the Australian average. It was in Tasmania that the failure of iodine prophylaxis in school children led to the discovery of the goitrogenic action of milk from cows fed on marrowstem kale (see pp 359-360). In New Zealand goitre is believed to have been prevalent among the Maoris long before the arrival of British settlers; it is now common both in North and South Island. Surveys

conducted in the 1920s showed high rates in schoolchildren in the Christchurch area more than 60% had goitre. Chemical analysis showed a deficiency of iodine in the recent alluvial soils of river valleys and in clayless sandy soils in the areas where the goitre rates were highest. Following the introduction of iodized salt there has been a marked decline in the prevalence of thyroid enlargement in children. Iodine deficiency in sheep, which at one time caused serious losses of lambs, has been overcome by the use of iodized licks.

FACTS AND THEORIES ABOUT ENDEMIC GOITRE *

The iodine deficiency of the soil may be involved in the production of goitre, the deficiency of the available iodine below the level necessary to supply the need of the thyroid gland. This question arises whether the deficiency is basic or due to a defect in the absorption of iodine from the alimentary tract or to the thyroid gland's inability to utilize the iodine taken up. The deficiency of iodine in the soil does not affect the argument that it is iodine that the thyroid gland depends for its maintenance of its normal function.

HARRINGTON

In 1867 Saint Lager listed 43 different views on the causes of endemic goitre ranging from various properties of air and water to faulty nutrition, poverty, insanitary living conditions and consanguinity in marriage. Although some of these views—such as that goitre is caused by drinking certain kinds of water—had been widely held since ancient times, there was little if any experimental evidence to support them. Towards the end of the nineteenth century the first systematic studies were undertaken

on the anatomy and physiology of the thyroid and much has since been learned about the structure and function of the gland in health and disease. It is now accepted that pathological enlargement of the thyroid represents an attempt to compensate for its inability to produce sufficient hormone, but the primary causes of this metabolic defect—whether exogenous, endogenous or both—still remain largely a matter of speculation.

Function of the thyroid

Vesalius, who gave one of the earliest descriptions of the thyroid, considered that its purpose was to moisten the lumen of the trachea. Similar views persisted until the end of the 18th century when Albrecht von Haller recognized the thyroid as a ductless gland secreting a special substance

* This article is based mainly on the following chapters: the monograph by Clements, F. W. H. on 'Iodine deficiency and the production of endemic goitre' (1949); the book by M. P. Pathologist and the book by C. F. & Snedden, V. W. Fr. (1949) on 'Endemic goitre' (p. 27); Langer, P. H. & G. (1949) 'The iodine deficiency goitre' (p. 351); Stanbury, J. B. Ph.D. (1949) 'The iodine deficiency goitre' (p. 61).

Harrington, C. R. (1933) 'The thyroid gland in health and pathology'. London, Oxford University Press.

into the bloodstream. Another hundred years elapsed, however, before the pioneer studies of Baumann opened the way to a better understanding of thyroid function. In 1895 he isolated from the thyroid a substance which he called thyroiodine because he found that it contained 10% of iodine. This could be shown experimentally to have exactly the same physiological action as whole thyroid preparations. Following up these studies Oswald isolated thyroglobulin in 1899. Research on the chemical composition of the active substances of the thyroid was intensified and in 1919 Kendall isolated crystalline thyroxine (3,3',5,5'-tetraiodothyronine) which Harington succeeded in synthesizing in 1926.

Meanwhile recognition had been growing of the part played by the thyroid in regulating physical and mental development and metabolic activity. In 1836 Cooper performed thyroidectomy in puppies and noted that it resulted in dulling of the faculties. Twenty years later Schiff carried out systematic thyroidectomies in various animals, most of which died, but in 1884 he found that death could be prevented by intra-abdominal transplants of thyroid gland. A year earlier Kocher had described the condition of *cachexia strumipriva* resulting from total extirpation of the thyroid in humans. He stressed the close relationship between this condition and cretinism and noted that the symptoms were identical with those of the myxoedema described a few years earlier by English authors. Similar observations were made by the two cousins J. L. Reverdin and A. Reverdin.

Thyroid hyperfunction was recognized at about the same time. The combination of goitre, exophthalmos and cardiac disturbances was first described by Parry in 1786. Attention was again drawn to this syndrome by Graves in 1835 and by Carl von Basedow in 1840. In 1886 Moebius attributed exophthalmic goitre to an intoxication of the organism resulting from disturbed thyroid activity. That patients suffering from exophthalmic goitre have an increased metabolic rate was first demonstrated in 1895 by Magnus Levy.

Thyroid hormones

Recent research has shown that in addition to thyroxine the thyroid contains a number of other iodinated thyronines and apart from 3,3',5'-triiodothyronine and possibly 3,3'-diiodothyronine these do not appear to be secreted into the bloodstream under normal circumstances. When strongly stimulated the thyroid may secrete newly formed hormones directly into the blood but usually they are stored in the form of thyroglobulin, a compound of peptide structure which is broken down by the action of certain enzymes (cathepsins) to release hormones as needed. Monoiodotyrosine and diiodotyrosine also formed in this process are normally deiodinated by a specific enzyme and do not reach the peripheral blood but large amounts of these substances have been found in the blood of patients with congenital goitre and hypothyroidism. diiodotyrosine has also been tentatively identified in the serum of two patients with endemic cretinism.

A normally functioning thyroid secretes 100–200 µg of hormonal iodine daily. Part of this—the protein bound iodine (PBI)—is precipitable with the serum proteins and therefore also known as serum precipitable iodine (SPI). The SPI value of the serum—normally 3.5–8 µg per 100 ml—provides a useful measure of thyroid function; concentrations lower than 3.5 µg per 100 ml being indicative of hypothyroidism. The output of thyroid hormone is largely controlled by the thyrotropic or thyroid stimulating hormone (TSH) secreted by the anterior lobe of the pituitary gland and the production of this hormone depends in turn upon the concentration of thyroid hormone in the blood. This self-regulatory or feedback mechanism ensures that the thyroid is stimulated to increased activity as soon as the concentration of circulating hormone falls and *vice versa*. Control of thyroid function is however a very complex matter and is still incompletely understood; there are a number of other regulatory influences the relative contributions of which are not known and it may be that they can affect to varying degrees one or more steps in the metabolic

cycle in the gland. Another fundamental question that remains unanswered is: What is the nature of the reaction produced on cells by the thyroid hormone? Several theories have been proposed but none has much evidence to support it. One suggestion is that it interferes with oxidative phosphorylation causing oxidation to proceed without the liberation of a corresponding amount of phosphate bond energy. Stanbury considers that this is perhaps the most likely of the theories advanced so far.

The iodine cycle

The iodine used in the synthesis of the thyroid hormones is derived from two sources: iodine-containing substances in food and drinking water and iodine split off from the circulating hormones by enzymes in the blood and returned to the plasma as iodide. Some of the iodide present in the blood is trapped by the thyroid gland; the remainder is excreted by the kidneys. The relative efficiency of these two processes is a measure of thyroid function and can be determined by administering radioactive iodine (iodine uptake test). The concentration of iodine in the resting thyroid is normally maintained at a level about twenty times that in the plasma unless the latter is very high and the trapping capacity of the gland approaches saturation. The trapped iodide is used for the iodination of tyrosyl residues to give monoiodotyrosine and diiodotyrosine but neither the mechanism of trapping nor that of iodination is well understood. It is known that trapping involves oxidative phosphorylation depends upon cellular integrity and the presence of sulphydryl groups and is inhibited by thiocyanate and perchlorate ions which even release trapped but uncombined iodine from the gland. It is also known that iodide is oxidized to iodine within the thyroid but it is not certain that the gland contains a specific iodide oxidizing system although there is some evidence that peroxidase may be concerned in the process. It seems probable at all events that the rate at which iodination proceeds in the gland is governed enzymatically and it may be that

the iodide is first converted to an intermediate storage form of iodine which can only react with the tyrosyl residues in the presence of a transferring enzyme.

Thyroxine is formed by the condensation of two molecules of 3,5-diiodotyrosine while the condensation of monoiodotyrosine with diiodotyrosine gives 3,3',5-triiodothyronine. Here again the mechanism by which these reactions are brought about is unexplained although it is generally assumed that one or perhaps two enzyme systems are involved. As already mentioned the hormones are stored in the gland in the form of thyroglobulin from which they are released as required into the bloodstream where they are again broken down and the iodine returned to the plasma thus completing the metabolic cycle.

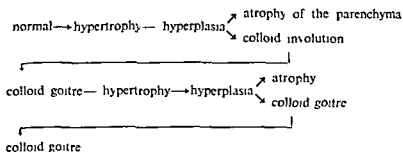
Dysfunction of the thyroid

If the thyroid is unable to trap sufficient iodine or fails to utilize the trapped iodine efficiently the feedback mechanism breaks down: i.e. an increased output of TSH by the pituitary produces no corresponding increase in the production of thyroid hormone. Under the prolonged influence of the relatively high concentrations of TSH the thyroid gland undergoes hypertrophy and hyperplasia apparently in an attempt to compensate for its deficient secretion of hormone. This is known as the hyperplastic or parenchymatous phase of goitrogenesis and is usually of short duration. If the enlarged gland is still unable to meet the physiological requirements for thyroid hormone atrophy occurs but this is a rare phenomenon. In the majority of cases the increased amounts of iodine trapped by the enlarged gland suffice to restore the endocrine balance and the gland enters the resting or colloid phase. Clinically the gland presents as a uniform soft enlargement indistinguishable from the hyperplastic goitre but histologically the appearance is different. In the normal gland the follicles are filled with a sticky fluid known as colloid and consisting mainly of thyroglobulin. During the hyperplastic phase the colloid gradually disappears from the follicles which undergo

various structural changes. The colloid phase is marked by a gradual return of the colloid to the follicles which largely regain their normal appearance. The gland remains enlarged however and although the total iodide content is close to that of a normal thyroid the concentration of iodide is much smaller.

While the colloid goitre may maintain the body in a state of euthyroidism the balance is a precarious one and any increase in the

demand for hormone or any reduction in the supplies of iodine immediately precipitates a fresh burst of hyperplasia. The reaction is often localized and it is common to find areas of hyperplasia and of colloid adjacent to one another. In regions where goitre is endemic phases of hyperplasia and involution alternate at frequent intervals, leading to progressive enlargement of the gland. This process—the classical Marne cycle—may be depicted as follows



With repetition of the cycle the hyperplastic reaction tends to become more localized. There is much evidence that it is this process that leads to the formation of the nodules characteristic of long standing goitres although some authors are of a contrary opinion. Using the technique of autoradiography Taylor has distinguished five stages in the development of the thyroid nodule. At first the nodule is very active producing most of the hormone secreted by the gland but in the later stages haemorrhage and necrosis occur the nodule then becomes cystic and fills up with inactive colloid. Such cysts may lead to complications either through pressure on neighbouring tissues or because they may be the site of haemorrhage or infection with formation of goitrous abscesses. The whole question of the pathogenesis and pathology of the thyroid nodule is very complex and still incompletely understood.

Sequelae of endemic goitre

According to Clements the usual sequel of endemic goitre in adults at least up to the fourth decade of life is the persistence of a

colloid or nodular goitre with euthyroidism, the only disadvantage being the aesthetic one. Matovinovic & Ramalingaswami on the other hand claim that the compensatory mechanism is not completely efficient so that there is always some degree of hypothyroidism. Clements concedes that myxoedema often develops during the fifth or sixth decade being much more common in women than in men. This is because the cycle of hyperplasia and involution leading to the progressive destruction of functional tissue is repeated more frequently in women. Pregnancy for example makes increased demands on the thyroid and is usually associated with a fresh outburst of hyperplasia and sometimes an increase in the size of the thyroid is observed with each menstrual period especially in girls up to the age of 18 years.

Studies on the prevalence of thyrotoxicosis in relation to that of endemic goitre have in many cases shown a distinct correlation toxic goitre being much more common in areas with a high prevalence of endemic goitre than in those where it is low. This is particularly true of North America the

British Isles parts of continental Europe and Australia. On the other hand no consistent relationship has been found in certain other parts of the world and some countries where the prevalence of endemic goitre has always been high appear to be relatively free from toxic goitre. Clements therefore asks whether the condition has been overlooked in the localities where it has not been reported or whether the sequelae of endemic goitre differ in different localities.

Some authors believe that nodular goitres predispose to cancer of the thyroid but the evidence is inconclusive. From a review of American literature Sokal concluded that cancer of the thyroid was twenty times more common among persons with hyperthyroidism than among those with euthyroidism. In Finland no difference could be found in mortality rates from cancer of the thyroid between areas with a low prevalence of endemic goitre and those with a high prevalence. On the other hand Spencer has found a correlation between the prevalence of endemic goitre and the death rate from malignant disease in general. He suggests that the lowered metabolic rate of hypothyroidism may possibly be associated with premature senility of tissue cells leading to increased susceptibility to cancer.

It is well known that cretinism tends to be of frequent occurrence in areas where the prevalence of endemic goitre is high and it is commonly assumed that there is a causal relationship between these two conditions. This has been questioned however by Clements whose views on the subject are summarized in a separate article (see p. 353).

Factors influencing goitrogenesis

Any factor that prevents the thyroid gland from responding normally to the stimulation of TSH may initiate the development of a goitre. Sporadic goitres may be due to congenital thyroid insufficiency but in areas where goitre is endemic exogenous factors must operate. It is generally agreed today that the most important of these is a deficiency of iodine in the diet. Other dietary factors include substances that interfere

with the trapping of iodide by the thyroid or with one of the stages in the synthesis of thyroid hormone. The possibility must also be considered of pituitary dysfunction leading to an excessive production of TSH and of the possible effects on the thyroid of prolonged disturbances of other endocrine functions. So far however only dietary factors have received much attention.

Water supplies

It is interesting that although goitre has at different times been attributed to a great variety of causes the belief that it is associated with some quality of the drinking water has persisted since very early times. At the beginning of the nineteenth century the goitrogenic action was generally attributed to a high mineral content of the water particularly to the presence of calcium salts. In 1831 Boussineault suggested that the high prevalence of endemic goitre in the Cordilleras of New Grenada (now Colombia) was connected with the limestone soil. Further studies in other countries pointed to the magnesium content of limestone as the significant factor. Thus in 1835 McClelland published a study showing that the distribution of goitre in India coincided with that of magnesium limestone formations. Nearly a hundred years later Stott and his colleagues drew attention to a direct correspondence between the distribution of goitre in the United Provinces of India and a high content of calcium in the soils and drinking water. Kelly & Snedden in their review of the prevalence and geographical distribution of endemic goitre quote numerous instances in which a high prevalence of goitre has been associated with hardness of the drinking water or with soils rich in calcium. It has been shown experimentally that calcium can exert a goitrogenic action or at least enhance the goitrogenic action of an iodine poor diet but it seems that rather large amounts of calcium are needed to produce significant results. It is believed that the action of calcium is an indirect one in that it inhibits the metabolic effects of thyroxine and thus increases iodine requirements. However the etiological significance of calcium and

magnesium in endemic goitre is still open to discussion

There is good reason to believe that drinking water may sometimes contain more powerful goitrogens than these minerals particularly when polluted by human or animal excreta. While studying the prevalence of endemic goitre in the Himalayas McCarrison (1906) noted that in 8 villages situated one below the other down the mountain side the prevalence steadily increased from 11.8% in the highest village to 45.6% in the lowest. These villages were all served by the same water supply which ran through open channels and became increasingly polluted on its way down. A ninth village situated some distance away with an independent unpolluted water supply was free from goitre. McCarrison showed that suspended matter filtered from the grossly polluted water of the village with the highest goitre rate caused goitre in volunteers: the goitrogenic action could be destroyed by boiling. This work has been followed up by Hettehe who believes the goitrogenic action to be due to substances of the urochrome type which bind copper in the serum. This problem too needs much further investigation.

Infection

Some authors consider that goitre is due to an infection of the thyroid, the chief proponent of this view being Greenwald. Painsstaking historical studies have convinced him that endemic goitre is of recent origin in many countries and that the pattern often resembles that seen in infectious diseases. He asserts that many of the earlier accounts of swellings of the neck are either unreliable or else refer to sporadic goitres, tuberculous glands or parotitis. In his view the infectious agent responsible for endemic goitre was at first confined to the Alps where it was present some 2000 years ago. From there it spread slowly to the rest of Western Europe and was then carried to other parts of the world by Europeans. While the possibility that goitre is due to an infectious agent cannot be excluded, there is so far no experimental evidence in support of this hypothesis.

Iodine deficiency

By contrast the theory that a deficient intake of iodine is the principal cause of endemic goitre has a sound scientific basis. As early as 1850 the French chemist Chatin carried out systematic iodine determinations on air, water, soils and animal and vegetable foods from various parts of France. His results indicated that the prevalence of goitre in the various regions was inversely proportional to the content of iodine in the environment. The analytical methods available at the time, however, were not sufficiently refined to enable the small quantities of iodine present in natural products to be accurately determined; other workers were unable to repeat Chatin's results, which were therefore discredited. Fifty years later came the chemical investigations on the thyroid (see above) which showed iodine to be an essential component of thyroglobulin and thyroxine. This made it clear that if the quantity of iodine available to the thyroid fell below a certain minimum a metabolic disturbance was bound to follow. Attempts to produce goitres in animals by feeding them on iodine deficient diets at first gave inconclusive results, as the diets were not sufficiently standardized. Recently (1956) it has been observed, however, that marked thyroid hypertrophy developed in mice given an iodine deficient diet of well defined composition even when each constituent of the diet was stopped in turn. Careful analyses of soil and drinking water in many parts of the world have in general revealed a close correlation between iodine content and the prevalence of goitre. The occasional discrepancies that have been noted may be taken to indicate that in these cases other goitrogenic factors were operating.

Further support for an association between iodine deficiency and goitre comes from studies on iodine uptake and excretion. In areas free from endemic goitre the mean daily excretion rate of iodine often exceeds 100 $\mu\text{g/day}$, whereas in endemic areas it is usually between 15 and 40 $\mu\text{g/day}$ and values of less than 10 $\mu\text{g/day}$ may be common. Correspondingly, uptake tests with radioactive iodine reveal a high avidity of the

thyroid for iodine in persons with a low excretion rate. Moreover the radioactivity of the gland increases more rapidly in goitre patients reaching a maximum 6 hours after administration of radioactive iodine as compared with 24 hours in normal subjects. If supplementary iodine is administered to goitre patients a positive iodine balance is gradually established and the excretion and uptake values approximate to those found in persons from non-endemic regions. This seems to be clear evidence that these patients suffer from iodine deficiency. Surprisingly however similar evidence of iodine deficiency can be obtained in persons living in endemic goitre areas but not showing thyroid enlargement. This must indicate either an exceptional adaptation to hypothyroidism in these subjects or that iodine deficiency is not the sole factor concerned in the development of goitre. It has been amply demonstrated that the administration of iodine exerts an adequate preventive effect in all but a very few instances but as Roche & Lissitzky point out the problem that arises is to what extent the action of iodides does not merely reflect the maintenance of the thyroid in its normal state or the restitution of a thyroid function possibly impaired by other endemic factors.

Goitrogens in the diet

In 1928 Chesney et al. observed that large goitres developed in rabbits fed almost exclusively on a cabbage diet. This observation has since been confirmed by many other workers and it has also been found that other vegetables of the genus *Brassica* such as cauliflower, turnips and Brussels sprouts possess similar goitrogenic properties. Perhaps the most striking example of such an action in man is that reported by Clements in Tasmania. Here the failure of iodine prophylaxis in schoolchildren was traced to a powerful goitrogen present in milk issued to the children under a free milk scheme started at the same time as the programme of goitre prophylaxis (see p. 359). It was found that the cows supplying the milk had been fed on chow moellier or marrowstem kale.

Both the milk and the kale caused thyroid hyperplasia when fed to experimental animals and the milk was shown to interfere with the uptake of radioactive iodine in humans as well as in animals. Finally Wright demonstrated in 1958 that the thiocyanate content of the milk is about six times that of milk from grazing cows. As already mentioned (p. 347) thiocyanates inhibit the trapping of iodine. The actual goitrogen present in chow moellier has not so far been identified however but the thiocyanate derivative L 5 vinyl 2 thiooxazolidone (goitrin) has been isolated from a number of *Brassica* vegetables as well as from the seeds of numerous other cruciferous plants. This substance which is a powerful goitrogen appears to be present in the plant in the form of a precursor, progoitrin. The conversion of progoitrin—a glucoside—to goitrin is thought to be brought about by enzymatic action. Cooking diminishes the goitrogenic action of the foodstuffs possibly by destroying the enzyme. The action of goitrin seems to resemble that of thiouracil and its derivatives rather than that of the thiocyanates since it inhibits thyroxine synthesis and its effect is only partially reversed by iodides. This would explain the failure of iodine prophylaxis in Tasmania. Kelly & Snedden cite a number of other instances in which vegetables of the *Brassica* genus have been thought to be responsible for a high prevalence of endemic goitre. In Belgium for example the increase in simple goitre noted during the war may have been associated with the increased consumption of cabbage and related vegetables. This hypothesis is supported by the fact that there was a parallel decrease in toxic goitre as would be expected if the diet contained an antithyroid substance. The reverse phenomenon—an increase in thyrotoxicosis and a decrease in endemic goitre—was observed in Denmark and it has been suggested that this was due to the cessation of imports of soya bean oil which was shown by McCarrison to contain an antithyroid factor and which was used in Denmark on a large scale before the war for feeding cattle. The importance of dietary goitrogens in the etiology of endemic goitre still remains to be assessed.

but it is highly probable that they are at least a contributory factor in some areas

It has been suggested at various times that an unbalanced diet predisposes to endemic goitre e.g. a diet over rich in fat or in protein or an excess or deficiency of certain vitamins. There is little evidence in favour of any of these views however. It is true that a high prevalence of endemic goitre is often associated with poverty and malnutrition but this might be explained by the fact that a poor diet is also deficient in iodine or that insanitary living conditions lead to pollution of the drinking water. It also has to be remembered that poverty and malnutrition are often found in small closed communities where a high rate of consanguineous marriages will tend to bring out any hereditary defect in thyroid function.

Experimental goitre

Whatever exogenous factors are ultimately found to be concerned in the etiology of endemic goitre it seems certain that the explanation of the wide variations in the size of the thyroid found among different individuals living in the same endemic area will have to be sought in endogenous influences. In an attempt to elucidate the nature of some of these influences Milcu has carried out a series of experiments on the production of goitre in animals under a variety of conditions. He claims that stimulation of the central nervous system accelerates goitrogenesis in rats given methylthiouracil or fed on a diet rich in cabbage. Inhibition of the central nervous system has the opposite effect as shown for example by the fact that chlorpromazine diminished the uptake of radioactive iodine by the thyroid and inhibited the action of thyroxine on the tissues. Sympathectomy and parasympathectomy both reduced iodine uptake and after parasympathectomy the ratio of the weight of the thyroid to the weight of the body increased by 18.6%. On the other hand cervical sympathectomy tended to decrease the goitrogenic effect of methylthiouracil with the production of a smaller goitre showing less

marked histological changes. Milcu suggests therefore that susceptibility to goitre may be influenced by variations in autonomic tone.

Intrathyroid injections of procaine were followed by a reduction in iodine uptake and a fall in the blood iodide level and basal metabolic rate. Similar though much less marked effects could also be produced by injecting physiological saline or by simply inserting a needle into the thyroid. From the results of these and other experiments Milcu concludes that irritation of the nerve endings within the thyroid leads to reflex inhibition of the secretion of TSH by the pituitary.

It appears that goitrogenesis may also be influenced by other hormones. Milcu found that in rats on an iodine deficient diet the change from a parenchymatous to a colloid goitre was accelerated by administering oestradiol, testosterone, the hormones of the adrenal cortex or extracts of the thymus and pineal glands. Under the influence of these hormones the weight of the gland fell by 50-65%. The effect may be dependent on the dose however for small doses of oestradiol increased the uptake of iodine by the thyroid whereas larger doses inhibited it.

There have been indications from recent research that immunological reactions may also play a part in goitrogenesis. To investigate this Milcu subjected rabbits to repeated immunization by giving 4 injections of a suspension of normal thyroid tissue at intervals of 15-20 days. Twelve days after the last injection complement fixing and precipitating antibodies were found in the blood and the thyroid showed changes characteristic of immunity thyroiditis. In animals killed 90 days after the last injection the thyroid showed marked hyperplasia and weighed nearly 4 times as much as normal. In rats thyroid tissue from animals kept on an iodine deficient diet or given methylthiouracil appeared to have a less powerful antigenic effect than thyroid from normal animals. The immunological response was exacerbated by TSH but reduced by cortisone. The interpretation of these results is at present uncertain but Milcu postulates that immunopathological factors may be concerned in the transition from a parenchymatous goitre to

a colloid goitre and in the development of the late degenerative changes

Although these experimental studies do not provide definite answers to any of the problems of goitrogenesis they give a number of pointers to future research. But as Roche & Lissitzky point out extrapolations of experimental results must be made with caution particularly as experimental thyroid hypertrophy is not strictly comparable with human goitre. Experimental procedures generally bring about rapid hypertrophy of the gland whereas in endemic goitre the pathological changes develop slowly giving the body time to become adapted to the progressive disturbance in hormone secretion. There

is no doubt that these pathological changes can be influenced by a great variety of factors whose relative importance remains to be assessed. The problem of the etiology of endemic goitre is thus far from being solved but it still remains true as stated by Greer in 1950 that very few cases of thyroid hypertrophy not due to iodine deficiency have been explained so far. Roche & Lissitzky therefore ask whether different etiological agents might not produce the same effects through the essential intermediary of a faulty supply of iodine to the thyroid which could then be accepted as the immediate cause of endemic goitre without prejudice to the wider question of the primary cause.

CRETINISM AND ENDEMIC GOITRE *

*besid thei nat simpl mind dness th h ad is now a d
the mu firmed the to gue immense and t mud d mb a st uma often
at the throat they h w a defo m d appearance and s t d n
solemn t tel ess tar ng and a t k st g bet th hands
ther bodi tw sed a ly the eyes d apart they show im
mode te la ghte a d de at unkn w th ngs*

FELIX PLATTER (1536-1614)

Cretinism was first recognized as a clinical entity in Europe in the sixteenth century. Felix Platter whose vivid description of the disease is quoted above seems to have been the first to have used the name *cretin* in a written document. The origin of the word remains uncertain however although it has been variously suggested that it is derived from the French *chrétien* from the Latin *creta* and—through the Romansh language of the Grisons (Switzerland)—from the Latin *creatura*.

The co-existence of endemic goitre and cretinism in the same locality was remarked on by many European writers during the eighteenth and nineteenth centuries. This

led to the assumption that endemic goitre predisposes to endemic cretinism the most widely held explanation being that progressive degeneration of the thyroid gland takes place in succeeding generations until ultimately a cretinous child is born. As Clements remarks however "this theory bears too much resemblance to Lamarckism and the inheritance of acquired characteristics to be accepted today. In a detailed discussion of the question which is summarized below he adduces a number of arguments against a causal relationship between endemic goitre and cretinism draws attention to the possible importance of consanguinity in the parents and makes a plea for an intensive investigation of endemic cretinism.

Cretinism is the end result of a severe disturbance in thyroid metabolism and depending upon the nature of this disturbance a number of types of cretinism may be defined. As early as 1871 Fagge had differ

* This article is based mainly on the following sources in the monograph *Endemic Goitre* Clement F W H et al (1950) *Endemic Goitre and related conditions*, p. 35. K H F C A Snedden, W W Fournelle and George Huald et al. *Endemic goitre*, p. 7.

Translation, quoted from Major R. H. C. (1939) *Class description of disease*, 2nd ed., Springfield, Thomas.

entiated between endemic cretinism and sporadic cretinism occurring in people who had never lived in a goitrous district. A modern classification given by Clements is as follows

- 1 Congenital thyroid aplasia
- 2 Familial congenital goitrous cretinism
- 3 Acquired athyroidism
- 4 Acquired hypothyroidism
- 5 Endemic cretinism

In *congenital thyroid aplasia* known also as *congenital myxoedema* the person is born without any functioning thyroid tissue as can be demonstrated by administration of radioactive iodine. Sometimes a goitre is apparently present but if the radioiodine uptake test is negative it is probable that the tumour is a remnant of the fourth pharyngeal pouch. The condition is seldom recognized at birth but many of the characteristic features of cretinism can often be recalled in retrospect. The baby has a large head and the anterior fontanelle is wide open. X ray examination of the bones shows delayed development of the ossification centres. Physical and mental development are severely impaired throughout life. Curvature of the spine is marked and a fully developed adult seldom stands more than 3 feet in height though the true length may be about 4 feet. The limbs are short and the skin is greyish white dry wrinkled and scaly. The tongue is often protruding. Congenital thyroid aplasias remain idiots and do not learn to speak or to understand the spoken word. The condition responds to the administration of dried thyroid or thyroxine particularly if treatment is started early in life.

On the basis of recent biochemical studies at least four categories of *familial goitrous cretinism* have been distinguished each characterized by a different type of defect in the metabolism of thyroxine. It has been suggested that two of these defects are transmitted by an autosomal recessive gene and the familial incidence of the disease makes it seem not unlikely that the other two types of defect have a hereditary basis.

In *acquired athyroidism* and *acquired hypothyroidism* there is either complete or

partial failure of thyroid secretion leading to a condition sometimes known as *juvenile myxoedema*. Many writers regard the condition as a sequel of infectious disease such as measles or whooping cough others attribute it to birth injuries involving the thyroid gland. McGirr & Hutchison suggest that in some cases enough thyroid tissue is present at birth to meet the needs of the child during the first few years of life but that the amount is insufficient for later needs. The presenting features are as a rule retardation of growth and mental development but the severity of the clinical signs naturally depends very much upon the age of onset of the disease and the degree of thyroid deficiency. Changes in the skin and the hair such as are seen in the *congenital* form may also be present and in severe forms speech and hearing may be affected.

Endemic cretinism

Like the other types of cretinism discussed above *endemic cretinism* can produce varying clinical pictures depending upon the amount of functioning thyroid tissue present. The commission set up in 1845 by King Carlo Alberto of Sardinia to study goitre and cretinism throughout his kingdom made the following classification

1 Cretins—people with only vegetative functions devoid of reproductive and intellectual powers and incapable of articulate speech

2 Semi-cretins—persons endowed with reproductive as well as vegetative functions but whose intellectual faculties are strictly limited to expressing bodily wants and are due solely to the impressions of the senses they are capable of rudimentary speech

3 Cretinous persons—persons whose intellectual faculties are less limited than those of semi-cretins but are still below the ordinary level they also have a less imperfect language carried on by words and gestures and are to some extent capable of following an occupation and doing manual labour

In fully developed endemic cretinism resulting from thyroid aplasia the clinical

picture is similar to that seen in sporadic congenital thyroid aplasia. The syndrome may not be apparent at birth but by the middle of the first year the retardation of physical and mental development is marked. The child does not walk until the sixth or seventh year and speech is limited to a few harsh sounds. A remarkable feature is the absence of the usual gradual progression from infancy to puberty and from puberty to old age as Clements puts it "infancy is prolonged to puberty and old age succeeds at once". This does not mean that cretins die young they may in fact have very long lives.

Surveys of endemic cretinism in the past have probably given misleading prevalence figures because of the failure to differentiate non-cretinous idiots and mental defectives from true cretins and semi-cretins—a difficulty still experienced today. The Sardinian Commission obtained rates varying from 0.01 / to 2.79 / while in other parts of Europe during the nineteenth century prevalence rates ranging from 0.4 / to 2.2 / were determined. However many of these data relate to military conscripts only and are not therefore representative of the country as a whole.

More recent surveys have given much lower figures but the precise significance of these results is difficult to interpret as they relate to relatively large areas whereas in fact cretinism is limited to villages. It does seem that there has been a big reduction in cretinism—for example in Switzerland—but there is a need for careful surveys to investigate the present position.

Etiology of endemic cretinism

In their review of the prevalence and geographical distribution of endemic goitre Kelly & Snedden make numerous references to the prevalence of cretinism, deaf mutism and idiocy in goitrous areas and refer to these afflictions as "sequelae of endemic goitre". This is in accordance with the views of most writers on the subject as pointed out earlier in this article. Clements however draws attention to the following facts which do not support the hypothesis of a causal relation-

ship between endemic goitre and endemic cretinism.

1 Endemic cretinism does not occur in all localities in an endemic goitre area even where severe endemic goitre has been present for several generations.

2 Cretinism is often concentrated in villages and even in households in a village.

3 Many cretins are the progeny of parents who did not have a thyroid enlargement.

4 The prevalence of cretinism seems to bear a direct relationship to the frequency of consanguineous marriages within the cretinous district. High rates are often found in remote relatively land locked valleys where consanguineous marriages are common. Thus in Hungary investigators found that the farther they penetrated into the mountains the more frequently they encountered cretinism.

The last observation coupled with the recent studies on familial goitrous cretinism suggest that in a proportion of cases at least endemic goitrous cretinism may be due to a recessive Mendelian factor. This would of course also explain the concentration of cretinism in households and villages and the fact that endemic goitre may be present for several generations without the appearance of cretinism.

Clements does not discuss why if this etiological explanation is correct severe cretinism and high goitre rates so often go hand in hand. Presumably this might be accounted for by a synergistic action between local goitrogenic factors—low iodine intake or goitrogens in the diet—and the inherited tendency to hypothyroidism. Clements hypothesis is not therefore opposed to a close etiological association between endemic goitre and endemic cretinism but it does offer an alternative explanation to that of a direct causal relationship with progressive deterioration of the thyroid gland being passed on from generation to generation. As he says an unequivocal answer to this question is long overdue and calls for an intensive investigation using the same methods as have been applied to the study of sporadic cretinism.

GOITRE CONTROL IN THEORY AND PRACTICE*

The old adage that one ounce of prevention is worth a pound of cure is outdone in the case of gout where one milligram of prevention is worth more than a thousand milligrams of cure

MARTNE ¹

Although it has often been claimed that endemic goitre is the easiest of all known diseases to prevent public health authorities are sometimes hesitant to introduce control measures on a large scale. In many areas adequate goitre surveys have never been made and the extent of the health problem may not be immediately apparent. Moreover the evidence regarding the safety and efficacy of iodine prophylaxis is not always readily accepted and even when a control programme has been agreed upon the authorities may be confronted with serious administrative and technical difficulties.

Health significance of endemic goitre

Where endemicity is high and many people are afflicted with large nodular goitres associated with a marked degree of hypothyroidism there can be no doubt that the situation constitutes an important public health problem. Apart from the grave disfigurement caused by such goitres the sufferers present obvious evidence of ill health. There is a slowing down of mental and physical activity—perhaps to the point of actual mental retardation—with a consequent loss of working capacity. Cretinism is usually common. There seems also to be some evidence that endemic goitre predisposes to thyrotoxicosis, cancer of the

thyroid and even malignant disease in general although these questions are still controversial

Difficulty in assessing the health significance of endemic goitre is likely to arise where endemicity is low and goitre is found mainly among adolescents. Matovinovic & Ramalingaswami are of the opinion that any clinically detectable enlargement of the thyroid however mild and silent it may be and even if it is confined to adolescent girls is a sign of abnormality. They point out that the enlargement represents a compensatory reaction though an incomplete one to thyroid insufficiency. Goitrous children tend to lag behind others in intelligence and need prophylactic treatment. Clements quotes data compiled by Stocks which show that whereas in boys the rate of thyroid enlargement begins to fall after the age of 14 years in girls it continues to rise until early adult life. Simple goitres he states often disappear in adult males but rarely in adult females particularly if they bear children. It seems that in women goitres go through alternate phases of hyperplasia and rest with subsequent involution leading to the formation of nodules. Thus even minor degrees of thyroid enlargement in young people may have severe sequelae in later life. Matovinovic & Ramalingaswami make the tentative suggestion that general prophylaxis should be resorted to if 10% or more of children between the ages of 7 and 15 have visible thyroid enlargement. Some authorities go further and recommend that a goitre rate above 5% should be considered of public health significance.

This raises the question of endemic goitre surveys to determine the prevalence and

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E. V. P. p 369

health significance of the disease Perez, Scrimshaw & Munoz advocate both palpation and inspection in carrying out these surveys. Mass surveys are most conveniently carried out in schoolchildren among whom large visible goitres are much less prevalent than among the adult population although the total prevalence of enlarged thyroid is roughly comparable in the two sections of the population. If only visible goitres were recorded this could lead to the false conclusion that goitre was not sufficiently prevalent to be of public health importance.

The authors recommend that the examiner stand or sit in front of the subject so that inspection and palpation can be carried out almost simultaneously. A gland 4 to 5 times the normal size should be recorded as goitrous. Of the various standards of comparison that have been suggested perhaps the most useful is that the lateral lobes of the thyroid should not be larger than the terminal phalanges of the subject's thumbs.

Perez et al. present a simple classification of goitres which they have found to be workable in extensive field studies in a number of countries. De Smet considers a more elaborate classification necessary for surveys in mild endemic areas and puts forward an alternative system. As Perez et al. point out, however, a high degree of accuracy is not necessary for prevalence surveys and a figure that does not depart by more than 25% from the true value is adequate provided that the areas included in the survey represent a random sample of the total population. The survey therefore needs careful planning; the sample must be representative of all the numerically important sections of the population in the age group studied and geographical characteristics, agricultural patterns, water supplies, racial distribution, economic status and even dietary practices should be taken into consideration in selecting localities.

Control measures

History of iodine prophylaxis

Although endemic goitre may have various causes and its aetiology is still imperfectly understood, it has been amply demonstrated

that in all but a few exceptional cases an increased iodine intake exerts an adequate preventive effect. Apart from attempts to improve the general nutritional status and to remove known goitrogens from the diet, control measures today are therefore based upon supplying iodides to the public in some vehicle that enjoys wide consumption. The use of table salt for this purpose was first suggested by Boussingault in 1831 after he had discovered the high iodine content of a certain natural deposit of salt regarded as more beneficial than other salts by the inhabitants of a goitrous area of Colombia. Little heed was paid to this suggestion, however, and similar recommendations by Grange K stl and others during the nineteenth century were likewise largely disregarded. This was due in part to the unhappy results of earlier attempts to use iodine for the treatment of goitre: the doses administered were much too high and the side effects frequent and severe.

Interest in iodine for the therapy and prophylaxis of goitre revived when in 1895 Baumann isolated from the thyroid a substance containing 10% of iodine which was thus proved to be a normal constituent of the gland. From 1916 to 1920 Marine & Kimball conducted a large scale experiment in iodine prophylaxis in which a daily dose of 0.2 g of sodium iodide in water was administered for 10 days in the spring and 10 in the autumn to 5000 schoolgirls in Akron, Ohio, USA. A similar number of schoolgirls acted as controls. Goitre developed among girls in the control group in about half those who had previously had a normal thyroid but did not among the girls taking sodium iodide. On the contrary, two thirds of those originally diagnosed as having goitre were found to have normal thyroids after sodium iodide therapy, whereas in the control group none of the enlarged thyroids returned to normal spontaneously. In spite of the relatively large doses of iodine, side effects were very rare when they did occur they disappeared within a few days of stopping medication.

Encouraged by the results, several cities in the goitre belt along the Great Lakes began

adding iodide to their water supplies and in 1924 an experiment in mass prophylaxis with iodized salt was begun in Michigan. Table salt containing 1 part in 5000 of potassium iodide was introduced, the salt producers and the wholesale grocers each bearing half the additional expense so that the selling price was not increased. The State Department of Health undertaking the health education of the public. It was estimated that within the first year 94% of homes were using iodized salt continuously. In five years the goitre rate in schoolchildren dropped from 38.6% to 9% and the latest survey conducted in 1951 showed it to be only 1.4%. In view of the fear expressed by some goitre surgeons that the use of iodized salt might cause an epidemic of thyrotoxicosis (Jod Basedow) a survey was undertaken in 1928 of almost 1300 adults with long standing goitre. Not a single case of toxic goitre was found that could have been attributed to the use of iodized salt.

Risks of iodine treatment

Matovinović & Ramalingaswami point out that secondary thyrotoxicosis naturally develops from nodular goitre. Prolonged deficiency of iodine may lead to the formation within the goitre of hyperactive hot nodules which produce practically the entire hormone output of the gland independently of the action of thyrotropin. In middle or old age the hyperactive nodules gradually increase in size and may then produce too much hormone, this condition being known as toxic adenoma. Overproduction of hormone may however also occur if the supply of iodine to the hyperactive nodules is suddenly increased; the condition is then known as Jod Basedow. Differential diagnosis between these two forms of hyperthyroidism may be difficult but the symptoms of Jod Basedow usually disappear spontaneously within a few weeks after treatment with iodine has been discontinued. Toxic adenoma is much more common than Jod Basedow and Matovinović & Ramalingaswami consider that hyperthyroidism occurring during iodine therapy is

in most cases unrelated to the administration of iodine and that the statistics on the occurrence of Jod Basedow are not very reliable.

The fear that the general use of iodized salt might lead to the widespread occurrence of Jod Basedow is attributable largely to experiences in France in the 1850s when relatively high doses of iodine were used. Lowenstein claims however that with the iodized salt used today the possibility of toxic effects is remote since the dosages are based on the physiological requirements for iodine which have been established by careful work. In fact the process of iodization merely represents the addition to the salt of a natural ingredient lost during the process of drying or refining or both. Lowenstein quotes the results of a number of studies to prove that the use of iodized salt is free from risk. A nation wide inquiry in Switzerland between 1922 and 1924 revealed that the frequency of thyrotoxicosis (5 per 100 000) was identical among persons consuming iodized salt and among those not using it. Among 2659 cases of hyperthyroidism Kimball saw only 6 that might have been related to the consumption of iodized salt and these were all in women over 40 years of age who had had nodular goitres for many years. A number of authors such as McClure in Michigan and Eggenburger in Switzerland have actually reported a considerable decrease in thyrotoxicosis after the introduction of iodized salt. On the basis of these and similar reports Lowenstein concludes that while there may be rare instances of a thyroid adenoma of long standing becoming toxic in a patient taking iodized salt the benefits of iodine prophylaxis in an endemic goitre area far outweigh the risk of an occasional toxic effect.

Among other objections that have been raised to iodine prophylaxis attention has been called to the occurrence of occasional allergic reactions in the form of urticarial or acneiform eruptions. Dermatologists do not appear to be yet agreed on the importance of these reactions and it has even been suggested that iodine deficiency may be a contributory cause of acne. It would seem safe to assume Lowenstein concludes that

there may be some persons who either are hypersensitive to iodine or may become sensitized through prolonged use of small doses. He suggests that for such persons non iodized salt should be made available on a prescription basis.

Efficacy of iodine prophylaxis

Experience in mass prophylaxis with iodized salt extending over a considerable number of years is now available from several countries. In all cases a substantial drop in the goitre rate has paralleled increasing consumption of the salt and the incidence of toxic side effects has been negligible. In Switzerland for example iodized salt was first introduced in 1923 on the proposal of the Swiss Goitre Commission. By 1954 it was estimated that 90% of all the salt consumed in Switzerland was iodized. In several cantons only iodized salt is used. Studies at the Institute of Pathology and Anatomy in Berne show that the mean weight of the thyroid of the newborn relative to body weight (g/kg) decreased from 3.12 in 1920-1924 to 1.28 in 1936-1938. In Lausanne the percentage of schoolchildren with normal thyroids rose from 42.3 in 1923 to 99.3 in 1937 and since 1930 none of the children has had a visible goitre. Studies on the mean weight of nodular thyroids in adults of different age groups before and after the introduction of iodized salt have been made in the canton of Vaud. A substantial decrease has taken place in all age groups particularly in men. Moreover whereas prior to 1924 nodular goitres were found in very young persons by 1946 no nodular goitres could be found in men under the age of 35 and only two women under 40. Other statistics for Switzerland as well as for a number of other countries demonstrate impressively the decline of goitre with increased consumption of iodized salt.

It should be mentioned that a variety of methods other than the iodization of salt have been tried for mass prophylaxis with iodine. The iodization of water supplies extensively practised in the Netherlands before and during the Second World War

has been found uneconomic because only a small proportion of the water is used for drinking and cooking purposes. The iodization of bread appears to be both economic and feasible in countries where bread is a staple foodstuff although it suffers from the disadvantage that the consumption of bread varies with the individual and in different age groups and strata of the population. The distribution of iodized tablets, iodized chocolate and iodized sweets has also been tried on various occasions. This is a useful method of administering iodine to vulnerable groups of the population—schoolchildren, pregnant women etc.—and it enables the amount of iodine administered to be accurately controlled. It would however be difficult to devise a system of distribution efficient enough to enable this method to be used for supplying iodine to the population at large. In New Guinea where difficulties have been encountered in distributing iodized salt to the scattered population a method has been devised of giving depot injections of iodized oil and it is claimed that these provide a continuous supply of iodine over a period of 2 years. Using larger volumes it may be possible to establish depots lasting up to 5 years.

An interesting instance of apparent failure of iodine prophylaxis has been reported from Tasmania. In 1949 iodized tablets were distributed to all schoolchildren up to 16 years of age. Five years later it was found that there had actually been a marked increase in the goitre rate in all age groups except girls of 12-17. A breakdown of the figures into 6 districts showed that in 3 there had been a general fall in prevalence over the five years whereas in 2 or possibly 3 others there had been a steep rise. On further investigation it was discovered that one year after iodine prophylaxis was started the Government had introduced a free milk scheme for school children and that in order to meet the demand for increased milk the farmers had been obliged to feed the cows on choux moellier (marrowstem kale) during the autumn and winter months when they are normally dried off. The area sown with choux moellier had increased nearly three

times and the districts where *chou moellier* had increased most were found to correspond exactly with those where there had been a steep rise in the goitre rates. It is known that plants of the genus *Brassica* of which *chou moellier* is a member contain the goitrogen L 5 vinyl 2 thio oxazolidone and it therefore seemed likely that this substance was finding its way into the milk and was responsible for the increase in goitre. This was supported by the fact that milk from cows fed with *chou moellier* when administered experimentally to humans and to laboratory animals interfered with the uptake of radio active iodine and by the fact that calves born of such cows developed marked thyroid hyperplasia. These interesting findings have triggered off a whole series of investigations on goitrogenic agents in a variety of plants the results of which are discussed on page 351. It thus seems clear that the failure of iodine prophylaxis in Tasmania was due to the presence of a powerful goitrogen in the milk. Similar instances of goitrogens in the diet although rare no doubt occur elsewhere. In such cases although it may be possible to counterbalance the effect of the goitrogen by stepping up the dosage of iodine it is obviously preferable wherever practicable to remove the goitrogen from the diet.

Administrative and technical difficulties

Once a programme of mass prophylaxis with iodized salt has been decided upon it is necessary to fix the level of iodization, organize the manufacture of a suitable grade of iodized salt and ensure its efficient distribution and consumption by as wide a section of the population as possible. The level of iodization and processes of manufacture are dealt with in the article on page 361. It has been estimated that at least 90% of the salt consumed must be iodized to secure the eradication of endemic goitre and experience has shown that the only rapid way to assure this is by legislation making iodization compulsory. In countries where scientific committees have recommended the

introduction of iodized salt but no legal compulsion has been attempted the public has continued to use mostly unfortified salt. About a dozen countries have so far made iodization compulsory. The law usually stipulates that all the salt in the country or in certain goitrous areas must be iodized and lays down the nature of the iodine compound to be used and the level of iodization. Sometimes the regulations also include instructions for the addition of stabilizers and conditions governing the packing and labelling of iodized salt offered for sale. In some countries non iodized salt is also available but can only be supplied on medical prescription. There may also be legal requirements covering the regular inspection of factories and installations and periodic analyses of samples of the product.

Unfortunately the drafting and approval of the legislation is often itself a lengthy process even when there is no opposition to the principle of compulsory iodization and once the law has been passed it is still necessary to create the administrative machinery to secure its enforcement. Difficulties encountered at this point—for example in obtaining the required funds from the Ministry of Finance—may hold up a control programme for years. And even after the production of iodized salt is under way the distribution may present new problems. A survey carried out in an endemic goitre area in Brazil in 1957-1958, three years after the passing of legislation on the iodization of salt, showed that practically no iodized salt was reaching the rural districts of the area and in Mexico only a few thousand people were found to be consuming iodized salt several years after the promulgation of regulations. In some cases the difficulties may be so great that alternative methods of iodine prophylaxis have to be resorted to such as the depot injection of iodized oil referred to above.

In at least two countries the introduction of iodized salt has been hampered by economic difficulties. Iodine compounds are expensive, special equipment is needed for iodization and additional labour has to be engaged. The over all cost will vary with

local conditions according to Lowenstein in the United Kingdom it is estimated to be about 5/ per ton of salt which amounts to less than 5/ of the cost of salt at average world prices. Assuming an average individual intake of 10 g per day (8 lb per year) the increase in cost per head works out at only 0.22d per year. On the other hand endemic goitre and its consequences undoubtedly cause considerable economic losses to a

country in the form of cost of treatment impaired working capacity of patients cost of institutionalization etc. It is difficult to estimate these economic losses but Lowenstein considers that they are unquestionably many times higher than the cost of a control programme in the words used by Marine in the quotation that heads this article "one milligram of prevention is worth more than a thousand milligrams of cure".

IODIZED SALT*

*I o s d e t c e r t n t h a t g o i t e o l d d i s a p p e a r f o m t h C o
d' l l e r a s f t h e a t h r i s s w o l d t a k e a p p r o p r i a t e s t e p s t o h a v e e s t a b -
l i s h e d t h e p r o t e c t i o n f o r e v e r y c a t n h g i r e s e n d e m c a d e p o t
o f s i t t a n g o d e w h i c h t h e e v e r y i n h a b i t a n t c l d g o t o b y
h s a l t a s h e q u a r d f o h i s c o n s m p t n*

BOUSSINGAULT

The recommendation quoted above ante dated by nearly a hundred years the first successful trials of iodized salt for the mass prophylaxis of endemic goitre. This long delay in putting Boussingault's advice into practice was largely due to lack of knowledge regarding thyroid metabolism and the daily requirements of iodine. About the middle of the nineteenth century a heavily iodized salt was used for a time in Austria, France and Italy but the frequency of side effects created a prejudice against iodine prophylaxis that has still not been entirely dissipated. The evidence for the safety and efficacy of iodized salt is reviewed in the article on goitre control (p. 356). Although accepting this evidence some countries have in the past been deterred from instituting programmes of mass prophylaxis by technical difficulties in the manufacture of a suitable grade of iodized salt. Inexpensive and comparatively simple processes are now available that are applicable to any of the usual methods of salt manufacture and give

products stable under exacting climatic conditions.

Most of the salt used for domestic purposes is produced by the evaporation of brine either in open pans or by the so-called "vacuum" process under reduced pressure. Iodization may be effected by adding a solution of an iodine compound to the brine by spraying the iodizing solution on to the salt or by dry mixing. In general the spraying method is very suitable for large scale manufacture since it is continuous and can form part of the routine operation of the vacuum process. For a relatively small production the dry mixing method is probably the simplest and most satisfactory. Stacpoole considers however that it is too expensive because of the long period of agitation needed to ensure a homogeneous mixture and he has devised a spraying method that can be used not only for the refined salt produced by the vacuum process but also for the coarse crystalline salt obtained by open pan evaporation. Brine treatment is sometimes used with open pan processes but it necessitates accurate analytical control which adds considerably to the expense.

*Based on H. L. Man, J. C. M. & McCartney W. (1960) *Endemic goitre* p. 411.

Boussingault, J. B. (1831) *Ann. Chim. Phys.* 48: 41.

and for this reason it has not been widely adopted

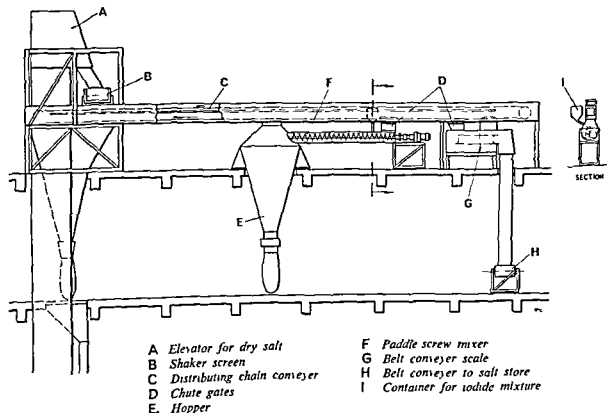
Spraying processes

In countries with a high standard of living the vacuum process of salt manufacture is generally preferred to the open pan processes not only because it gives a much higher output but also because it yields a fine free running salt of uniform grain size and a high standard of purity. Iodization is very conveniently effected by spraying a solution of potassium iodide on to the salt as it passes on a conveyor belt from the evaporators to the final hot air drier. The solution is delivered under constant pressure from a storage tank to a series of nozzles. The level of iodization is readily controlled by adjusting

the concentration of the solution the spraying pressure the size of the nozzle orifices and the speed of the conveyor. Uniform iodization is ensured by stirring the salt while it is in the drier. An Austrian machine (Fig 1) uses a worm screw or paddle screw to mix the salt before drying. This machine has an hourly output of 5000 kg of iodized salt. A non-continuous spraying process in which the salt is iodized batchwise in a mixer was patented in Germany in 1936.

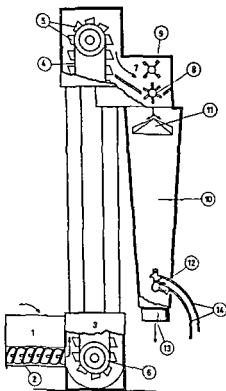
In most parts of the world salt is still produced by solar evaporation of brine or by evaporation in shallow pans heated directly by solid fuel. In this way a coarse crystalline salt is obtained which is usually iodized by dry mixing but Dr Herbert Stacpoole chief of the Mexican Antigoutre Campaign has designed a simple cheap portable machine

FIG 1 AUSTRIAN IODIZATION PLANT MANUFACTURED BY MASCHINEN UND TRANSPORTANLAGEN G M B H STOCKERAU



Reproduced by courtesy of Maschinen und Transportanlagen G.m.b.H. Stockerau Austria

(Fig. 2) for the iodization of such salt by a continuous spraying process. The salt is fed by a worm screw into aluminium buckets attached to a vertical rubber belt which elevates the salt to a height of about 3 m before discharging it into an aluminium lined hopper. The salt then drops through a rotating sluice into the iodizing chamber. An aluminium grill placed near the top of the chamber scatters the salt so that it falls in a continuous shower. The iodizing solution is sprayed upwards from the bottom of the iodizing chamber—which is rather more than 2 m high—and thus makes intimate contact with the falling grains of salt. Stacpoole believes that this machine is superior to those usually employed because spraying the salt on a conveyor belt permits iodization of the surface of the salt layer only and mixing by a worm screw is inefficient. The machine can iodize 5 metric tons of salt per hour and experience has shown that 1 ml of solution is enough to iodize uniformly 1 kg of salt, whether it be coarse ground or free running.



- 1 Al m m l d h ppe
- 2 If m sc w
- 3 El to
- 4 R bber b lt
- 5 Al m m b k t
- 6 D g p ll f el to
- 7 Al m m-l d h ppe
- 8 R t g l c
- 9 Si rr
- 10 lodʒ g hambe
- 11 Al m m grill
- 12 Sp ay g f dʒ g l t
- 13 O ml to odʒ g hambe
- 14 C mp ss d-a h

To prevent caking of free running salt drying agents are usually added which also act as stabilizers. If such salt is to be iodized by dry mixing the simplest procedure is to prepare a stock mixture of the stabilizer with ground potassium iodide. This mixture is then added in the required quantities to batches of the salt. As the amount of stabilizer is large compared with the amount of potassium iodide very uniform iodization is achieved. The time required for thorough mixing must be ascertained by analysis of a trial batch, and samples of each batch should be analysed as a control.

Dry mixing is less straightforward in the case of the crystalline salt obtained by the open pan process owing to its coarse particle size. As this is the only type of salt manufactured in many countries it is important to have simple cheap processes available. A suitable process was devised a few years ago by the Chilean Iodine Education Bureau, London. The salt passes from a bulk feeder

into an enclosed worm screw mixing conveyor into which is also introduced a mixture of one part of potassium iodide or iodate and ten parts of calcium carbonate or any available free flowing powder. This iodizing mixture is supplied from a precision feeder at the rate necessary to provide a final product containing the desired proportion of iodine. Control is facilitated by the addition of the inert powder which gives greater bulk to the material. The mixing conveyor is fitted with right and left hand paddles to ensure intimate mixing of the salt with the iodizing mixture during passage through the worm. At the end of the conveyor the iodized salt is collected directly in bags or other containers and for the whole operation of the plant a minimum of skilled labour is required.

A plant operating on this principle and designed for an output of approximately 10 tons per day costs about £420 (\$1175). Larger plants capable of producing up to 25 tons per day can also be supplied at only slightly increased cost. A number of variations on the original design have in fact been produced to meet the requirements of various countries and the process is being operated satisfactorily in Central and South America, India, Rhodesia, the Union of South Africa and Yugoslavia.

Brine treatment

The open pan evaporation of brine may be operated either on a continuous basis or as a batch process. In the continuous method the salt crystals are removed from the bottom of the pan at frequent intervals by means of perforated shovels and allowed to drain on the floor or on racks placed beside the pans. If potassium iodide is added to the brine it does not crystallize with the salt but the mother liquor adhering to the crystals leaves behind a residue of potassium iodide as it evaporates. The quantity of mother liquor adhering to the salt varies with the conditions of evaporation and must first be ascertained by routine tests. It is then possible to calculate the concentration of potassium iodide that must be maintained

in the brine. By carefully controlling the rate of addition of potassium iodide and the rate of evaporation, very uniform iodization can be achieved. If the salt is being produced by the batch process the requisite amount of dilute potassium iodide solution is added to each batch of brine, the residual mother liquor in the pans being re-used with addition of fresh brine so that no loss of iodide occurs. As already indicated this method of iodization necessitates skilled supervision and constant analytical control which renders it unsuitable for general adoption.

Level of iodization

The optimum level of iodization of salt depends on the average daily dose of iodine needed to prevent goitre in a community and on the average daily consumption of iodized salt per head. The available evidence suggests that in endemic goitre areas each person should receive a daily supplement of about 150 μg of iodine. In some areas larger supplements (up to 300-400 μg daily) appear to be necessary presumably in order to counteract the effect of goitrogenic agents. The *per caput* consumption of salt varies with racial, climatic and other factors; it is higher for example in tropical than in temperate climates. It is also necessary to take into account whether all food salt is to be iodized, including that used by the food industries or only table salt.

In the USA, Canada and most countries of Latin America the level of iodization is based on an estimated average per head consumption of 6.5 g of table salt per day and is calculated to provide a daily supplement of 500 μg of iodine or 650 μg of potassium iodide. The level is thus 1:10 000. In most European countries on the other hand much lower levels are used, calculated to supply only the 100-150 μg of iodine per day estimated to be the body's actual physiological requirements. Thus in Switzerland where all food salt is iodized the level is 1:100 000, while in the United Kingdom where only table salt is iodized it is 1:40 000. Holman & McCartney suggest that for countries with a moderate goitre rate the most satisfactory level is probably 1 part of potas

sium iodide to 20 000 parts of table salt the level at present adopted in New Zealand. In countries with a high prevalence the level of iodization should be increased to 1:10 000. At all events the level fixed by the public health authorities should ensure that a minimum of 150 µg of iodine is available in the quantity of salt consumed daily per head and where the dietary standard is low or there are other adverse factors this amount should be increased to 300-400 µg.

Stability of iodized salt

It is obviously important to ensure not only that the salt has the required iodine content when it leaves the factory but also that no loss of iodine occurs on storage. Some countries make it a legal requirement that stocks of iodized salt should be analysed at regular intervals. Investigations have shown that salt iodized with potassium iodide may be subject to losses if it is not dried during manufacture or if it is exposed to a humid atmosphere, excessive aeration, sunlight or heat. The stability is decreased if the salt has an acid reaction or contains impurities derived from the mother liquor. In the manufacture of free running salt by the vacuum process it is usual to add a substance with anti-caking and stabilizing properties. One of the stabilizers most often used is calcium phosphate and a special grade of basic tricalcium phosphate is manufactured for use in the preparation of iodized salt. Other stabilizers include magnesium carbonate, sodium bicarbonate, sodium carbonate, calcium carbonate, calcium oxide, sodium thiosulfate and activated carbon. Since vacuum salt is of a high grade of purity and is completely dried during manufacture when stabilized in this way the iodine content

will remain unchanged for long period provided that the salt is packed in containers with impervious linings and stored in a cool dark place. In fact tests on some samples showed no loss of iodine even when stored for 10 months on an open shelf—for 7 months of this time with the top of the packet fully open. When the samples were stored in a dry cupboard there was no caking and no loss of iodine over a period of 21 months.

Salt manufactured by the open pan process is very liable to contain both moisture and impurities. It is frequently stored in bulk in ordinary hessian bags and is likely to be exposed to adverse climatic conditions. It has therefore been recommended that such salt should be iodized with potassium iodate which has been shown to be much more stable than potassium iodide but is equally effective as a source of iodine for thyroxine synthesis since it is rapidly converted to iodide on ingestion. Another advantage of potassium iodate is that it has a lower solubility than the iodide and is therefore less likely to migrate from the salt to the container if the latter should become damp. Crude table salt iodized with potassium iodate was subjected to a severe test of stability by Arroyave Pineda & Scrimshaw. A 50-kg sample contained in a hemp fibre sack was stored in an open room in the tropics for 8 months, 4 of which were dry and 4 rainy. Although the average humidity ranged from 70 to 84% the loss of iodate over the whole period was only 3.5%. Furthermore migration was negligible. Similar findings have been reported by other workers. As far as the toxicity of potassium iodate is concerned it is known that large single doses are tolerated and experience in countries where iodated salt has been used has not given any indication of untoward effects.

Reports of Expert Groups

Training of nurses abroad *

The report of the WHO Inter Regional Conference on Post Basic Nursing Education Programmes for Foreign Students held in Geneva in October 1959 is addressed mainly to the nursing profession but has a wider application. The aim of providing these courses in foreign countries is to train nurses from varied backgrounds to meet with skill and confidence the changing health needs of the people whom they serve. To the nurse herself their value is that they broaden her horizon and enable her to see her profession in a new light by acquainting her with other lands and other cultures. To the home country the essential benefit is the gain in knowledge and potential leadership in this field of public health.

The report of the Conference discusses the practical details of administering such programmes details that must be considered in organizing any type of study travel—the preparation of the student for the journey the selection of areas and institutions the desirability of personal contacts between the receiving institutions the administrators of the scheme and the beneficiaries the advance information to be exchanged the whole range of problems confronting the student during her sojourn abroad and finally the difficulties of readjustment on her return.

The first stage in such a programme is selection of the student. In this there are many factors to be weighed such as her maturity and her capacity to learn and to adjust herself to changed conditions of life and work. It is felt that more information

might well be sought about the significance of the individual factors that make or mar the career of the student abroad.

For the second stage—preparation for the sojourn abroad—the adjustment of the student can be facilitated by briefing her on such aspects as the type of post she will be expected to fill on her return so that she can see her studies in relation to her ultimate career. She should consider herself in some sense an ambassador ready with information about the life and customs of her own land and prepared to display some understanding of the country of study. More attention might be paid to providing her with clear simple information on such matters as travel arrangements money clothing living conditions and social customs. The receiving institution should accept certain responsibilities some obviously concern the practical problems of accommodation and adjustment while others are inherent in the educational plan. The institution has a duty to survey its resources and to decide how many students it can cater for with the teaching staff and equipment available the opportunities it can provide for individual tuition and the facilities it has for practical work. It should satisfy itself that arrangements for field work are sufficient to meet the growing needs of the trainee. The key members at least of the faculty should have had experience in working or studying in other countries as only thus can they gain a real appreciation of student needs and of their capacity to fulfil them. It is of the utmost importance that faculty members should be in personal touch with students and discuss and guide both institutional teaching and field work. While the diverse needs of nurses can best be met through individually planned pro

WHO Inter Regional Conference on Post Basic Nursing Education Programmes for Foreign Students (1960) Report (1961) 11th O.G. 1. h. R. p. 5. No. 199. Geneva, 48 p. Price 3/6 \$0.60 Sw. fr. 2.—Also published in French and Spanish.

grammes this system introduces its own hazards. It adds considerably to the strain on the resources of the receiving institutions and may at the same time appear to place the students in a special group—a category that might suggest inferior qualifications. Further consideration should be given to achieving a balance between these factors.

The final stage—readjustment to the home country—appears hitherto to have been relatively neglected in planning for study travel. Difficulties of re-adaptation occur in ordinary life and in the nursing situation in which the returning student finds herself—both in relation to professional colleagues and to patients. Nurses who have studied in more advanced countries may feel keenly the restrictions imposed by lack of equipment or an apparent indifference on the part

of the home administration. However, those who take the time and trouble to re-learn the home situation as a whole and avoid the temptation of trying to impose novel methods on unwilling hearers become adjusted with little difficulty.

The participants in the Conference hoped that the suggestions put forward would be studied by those responsible for nursing education programmes for foreign students and more widely by anyone interested in the general educational questions raised by study in foreign countries, in particular the personal adjustments required from the student at all stages—before the period of study during adaptation to unfamiliar conditions of living and learning and in the process of readaptation to the home country on return.

Scholarship in cardiology

The Swedish National Association against Heart and Chest Diseases will award a research scholarship to a non-Swedish cardiologist in 1960 and WHO has been asked to help choose a suitable candidate. The stipend will amount to 25 000 Swedish crowns for one year which should also cover travelling expenses.

Applicants are invited from candidates of proven research ability who are at present engaged in research on cardiovascular disease and are interested in studying particular aspects of this field in Sweden. The age limit is 45.

Each applicant should provide a brief curriculum vitae together with details of research activity and of the proposed subject of study in Sweden. Prints of original work should accompany the application. Candidate should be endorsed by the respective institutes (or clinics) which should ensure posts and research facilities for them on their return.

Applications should be addressed to Chief, Cardiovascular Diseases Unit, World Health Organization, Palais des Nations, Geneva, and should arrive by the end of September at the latest. It is expected that the scholarship will be awarded at the end of October 1960.

Notes and News

Food borne infections and intoxications in Europe

General living conditions and the standard of food hygiene have improved in most European countries thus causing a fall in the incidence of dangerous food borne diseases. Nevertheless there has been a tendency during the last decade for the incidence of gastro-enteritis and bacterial food poisoning to increase. Possible reasons for this are discussed in a recent number of the WHO Bulletin¹

A long time has passed since food poisoning was first linked with the import of foodstuffs from tropical and semi tropical countries. Only when these imports began to reach Europe in substantial amounts however did the connexion become of real importance. Not all imports have been convicted of harbouring organisms that cause food poisoning: the chief culprits are probably cattle foodstuffs (particularly fish blood and bone meal) which are imported on a large scale from tropical countries. They have been found to contain a large number of enteropathogenic *Salmonella* which infect the animals ingesting them. The animals in turn infect the abattoirs: the premises where the meat is processed or the persons who handle the meat who then become carriers and infect others.

This influx of pathogenic organisms has coincided with a marked change in the eating habits of many Europeans. They now eat more perishable foods and eat at least one meal a day away from home. Large scale catering is therefore common and is all too often associated with inadequate preparation and preservation of the food and ignorance of the danger incurred thereby. With the enormous increase in international travel too there has been a tourist invasion of the countries of southern Europe

where these infections aided by the climate and the often lower standards of hygiene are more frequent.

Although it can be said that food borne infections have increased exact figures to prove this are difficult to obtain. One reason for this is that the terminology used in the diagnosis of these diseases is in a state of utter confusion. Another is that only a few experts have up-to-date knowledge of the various kinds of bacterial food poisoning. Yet another is that sporadic cases are not notified to the health authorities while more serious outbreaks are simply diagnosed as non specific infections. From what information is available it would appear that *Salmonella* infections are most frequent. *Shigella* food poisoning is most often found in the south south-east and east of Europe. Other organisms such as *Alkaligenes*, *Aeromonas* and *Pseudomonas* occasionally cause infection and *Escherichia coli* has recently been incriminated in outbreaks of diarrhoea in nurseries and children's hospitals. Food borne intoxications of staphylococcal origin are becoming more and more frequent the infection being transmitted either directly or through contaminated utensils. So too in some parts of Europe are cases of *Clostridium welchii* poisoning. In Norway they are diagnosed more frequently than staphylococcal infections the vehicle of the toxin being usually meat or sauce kept at room temperature and eaten next day without further thorough heating. Botulism is much less common than it is elsewhere in the world.

This increasing incidence of bacterial food borne infections and intoxications calls for closer supervision of food products, better food hygiene awareness in both producers and consumers of the dangers and legal measures to prevent the spread of pathogenic organisms in food products. The public health and veterinary authorities should co-operate to achieve these ends.

Compulsory and voluntary vaccination

When should vaccination be compulsory when voluntary? The theory has been that, if a disease is dangerous and a satisfactory vaccine against it is available vaccination should be compulsory to protect the persons endangered on the ground that some persons will always if not compelled refuse to be vaccinated and thus endanger others. But at what stage does it become no longer worth while to vaccinate the whole community? Again if it is agreed that vaccination is no longer something that the whole community should be asked to endure should the alternative be vaccination of those groups in the community particularly exposed to the risk of contracting the disease or should vaccination be voluntary?

These are not academic questions but questions that continue to excite lively controversy. Whenever an outbreak of smallpox occurs as a result of infection imported from abroad (as still happens every year or two) in the few countries that have changed the law to make vaccination against smallpox no longer compulsory it is liable to be used as an argument in favour of reintroducing compulsion showing that the principle of compulsory vaccination has its supporters even when the disease has become so uncommon that it only endangers the community when it is sporadically introduced from outside. This controversy about compulsory and voluntary vaccination is not confined to one or two countries but may readily be deduced from the accompanying table to be a feature of most countries at least in the European Region.

Many of these European countries have broadly similar conditions but there is no uniformity in

GENERAL INFORMATION ON VACCINATION AGAINST SPECIFIC DISEASES

vaccination against the following diseases	Algeria	Belgium	Bulgaria	Czechoslovakia	Denmark	France	Germany	Greece	Hungary	Italy	Japan	Netherlands	Poland	Portugal	Romania	Soviet Union	Spain	Sweden	Switzerland	Turkey	U.S.S.R.	Yugoslavia
Cholera (BCG)																						
Smallpox							(C)															
Diphtheria						(C)	(C)															
Typhoid							(C)															
Scarlet fever							(C)															
Polio (BCG)																						
Measles																						
Typhus																						
Paratyphoid																						
Cholera																						
Dysentery																						
Leptospirosis																						
Plague																						
Brucellosis																						
Typhoid																						

Scarlet fever A true measles perennally in USSR and Y post is in many perennally in Finland and USSR adenovirus
in table
in P and USSR Q fever perennally in P and R but is informal on vaccination no included
V = voluntary
- = no vaccination performed
= not known
C = compulsory
(C) = compulsory for certain groups (defined groups physically etc.)

their vaccination practices. Alone among them Czechoslovakia makes vaccination against polio myelitis compulsory for the whole community and vaccination against influenza compulsory for some groups. All countries but Ireland and the United Kingdom make vaccination against smallpox compulsory but the compulsion is limited to certain groups in Finland and Morocco and to certain cantons in Switzerland. About half of the countries make vaccination against diphtheria compulsory about half voluntary. Most abjure compulsion with pertussis but Bulgaria, Czechoslovakia and Yugoslavia prefer it. So too with tetanus, typhoid and other diseases. Czechoslovakia, Greece and the Netherlands even make vaccination against cholera compulsory for certain groups and Bulgaria insists similarly on vaccination against dysentery.

The WHO European Technical Conference on the Control of Infectious Diseases through Vaccination Programmes from whose report¹ the table has been taken remarked that in many countries voluntary immunization has had results as good as or better than those of compulsory vaccination. There is a general tendency to abandon compulsory vaccination which reflects the growing educational level of the population. But—the Conference stressed—no hasty steps should be taken to make vaccination voluntary for it may still be necessary in some countries and in any case a sudden change might be misinterpreted. The most important instrument in successful vaccination is health education of the people which should be pursued regardless of whether vaccination is compulsory or not.

Expert Committee on Malaria

A WHO Expert Committee on Malaria met in Geneva from 25 to 30 July 1960 to examine the present situation of malaria eradication in the world and the prospects for the future. As many eradication programmes are reaching the more advanced stages the Committee reviewed the principles and techniques of evaluation and surveillance.

Criteria of eradication were discussed in connexion with the request of the Thirteenth World Health Assembly that the Director General establish an official register listing areas where malaria eradication has been achieved, after inspection and certification by a WHO evaluation team. The Committee also considered whether any revision of the dosages and cycles of residual insecticides commonly used at present should be recommended and reviewed the use of antimalarial drugs to prevent the re-introduction of malaria in the final stages of eradication and among nomadic populations.

The recent discovery that malaria of lower monkeys can be transmitted to man has implications for eradication programmes since a reservoir of malaria in monkeys could conceivably add to the difficulties of eradicating human malaria in certain countries. While the dangers of this possibility should not be exaggerated, ways of dealing with the problem will have to be found and these were discussed. The new discovery has its positive side since the existence of a malaria parasite that causes the disease in man but can also be studied in monkeys could be extremely helpful for research.

An account of the Committee's work will appear in the Chronicle when its report is published.

Natural foci of infection

A training course on natural foci of infection is at present (15 August 18 September) being held in the USSR by the WHO Regional Office for Europe. It is concerned with the control of insect borne diseases in rural areas and provides a follow up to an earlier course on the control of insect borne diseases in urban areas and large ports held in Amsterdam and Liverpool.

In all 17 physicians, entomologists and biologists are taking part in the course: 11 from the European and 6 from other regions. The lecturers come not only from the USSR but also from Czechoslovakia, the Netherlands and the United Kingdom. The course covers the theoretical and practical aspects of the basic principles of natural foci of infections. Formal lectures are being given in Moscow and in Leningrad where the concept of natural foci of infections was first

formulated under Professor Pavlovsky and field work is being studied along with research in the Georgian SSR. In Moscow and Leningrad participants in the course are to visit various institutions to see how Professor Pavlovsky's teaching is applied. Among the diseases being studied are plague, tularaemia, leptospirosis, toxoplasmosis, tick-borne spotted fever, Q-fever, leishmaniasis and brucellosis. Practical work includes the collection and identification of such vectors as mosquitoes, sand flies, black flies, fleas and blood-sucking mites and ticks. The role of mammals and birds is also being studied.

Administration training for nurses

A course on nursing administration sponsored by the WHO Regional Office for Europe was held from 1 to 27 August in Oxford, England. The twelve nurses attending the course were nominated by the Governments of Austria, Czechoslovakia, Germany, Greece, Italy (2 nurses), the Netherlands, Poland, Portugal, Switzerland (2 nurses) and Yugoslavia and all

hold senior positions in the administration of nursing services in these countries. The Regional Office granted a stipend and book allowance to each student in addition to covering tuition fees and travel expenses.

Background material for the course included the WHO monograph *Principles of Administration Applied to Nursing Service* and the report of the European Conference on Nursing Administration held in Bad Homburg, Germany, in November 1959. Students had also been asked to study the administrative structure of nursing in their respective countries, particularly the organizational set-up and the administrative techniques used in their own services. During the course they heard lectures on the basic principles of administration and on their application to hospital nursing, a public health nursing service and a school of nursing. The lectures were interspersed with practical work, group discussions and visits. Ample opportunities were provided for the students to participate in group work and to discuss problems connected with their work as nursing administrators.

Goddard H. A. (1958) *Principles of administration applied to nursing service* (World Health Organization Monograph Series No. 41), Geneva.

People and Places

Public Health Adviser to Togo

WHO has appointed Dr Lucien Pierre Noel of Haiti as Public Health Adviser to the newly independent Republic of Togo. In this capacity he will help the Government of Togo co-ordinate its public health programmes, survey health conditions, plan long-term national health programmes and strengthen the public health administration at local, regional and national levels.

Dr Pierre Noel is a graduate of the Medical School of the University of Haiti and holds the degree of MPH from the Public Health School in Mexico. Before joining WHO he held the posts of Chief of the Maternity Services of the General Hospital, Dean of the University Faculty of Medicine and Pharmacology and

Assistant Director General of Health of the Department of Public Health, Port-au-Prince, Haiti.

WHO representative in Morocco

Dr Olivier Leroux, of Canada, has been appointed by the WHO Regional Office for Europe as WHO representative in Morocco. After studying at the Universities of Ottawa and Montreal, Dr Leroux specialized in tropical medicine and directed various hospitals in India and Burma. From 1945 to 1947 he served as Assistant Director of Medical Services, North Caribbean Area. Returning to Canada in 1947 he did pioneer work in the control of tuberculosis among Eskimo populations. After joining WHO in 1953, Dr Leroux served as Area Re-

representative in India and was subsequently in charge of programme co ordination at WHO Headquarters

Rural health and community development

As part of its community development programme the Government of India is extending health services and the training of health personnel in a number of states with help from WHO and UNICEF WHO has appointed Dr Gustav Vig of Norway as Chief Public Health Officer to the rural health development programme in the State of Lucknow

Dr Vig is a graduate of the Medical School of Oslo University and obtained his M P H degree at the University of Minnesota USA He has served for four years as a district health officer and for ten as a provincial public health officer in Oslo

Environmental sanitation

Mr Elie D Pagiras has been appointed by WHO to help the Government of Guinea carry out an environmental sanitation survey and programme in both urban and rural areas Mr Pagiras who is of French nationality obtained his Diploma of Civil Engineering at the University of Caen France From 1949 to 1955 he was employed as district sanitary engineer by the Ministry of Health Jerusalem after which he returned to France to direct an agency organizing public works

Mr Jose Silveira of Brazil has been appointed WHO sanitary engineer in Kenya where he will help to plan and launch environmental sanitation programmes in three separate rural areas Mr Silveira who holds an M P H degree from the School of Public Health University of Minnesota USA has been employed by the Special Public Health Service of Brazil since 1950

Social Paediatrics

Since 1958 WHO has been helping the Higher Institute of Public Health Alexandria United Arab Republic to train professional workers in all fields of public health As part of this programme Dr Sidney S Chipman of the United States has been appointed WHO Visiting Pro-

fessor of Social Paediatrics at the Institute for a period of one year starting August 1960

In order to accept this assignment Dr Chipman has obtained leave of absence from the School of Public Health University of North Carolina where he has been Professor of Maternal and Child Health since 1950

Joint UNICEF/WHO training programmes

The UNICEF/WHO Joint Committee on Health Policy recommended at its meeting in December 1959 that a study be made of jointly assisted training programmes for permanent health services benefiting mothers and children Dr Martha Eliot has been appointed as a consultant to WHO to carry out this study and will visit selected training programmes in most of the regions Miss E Orbell Principal of the Post Graduate School for Nurses in Wellington New Zealand will co operate in the study as consultant for the evaluation of the nursing and midwifery aspects of the training programmes

Dr Eliot became Director of the Division of Maternal and Child Health United States Children's Bureau Washington D C in 1974 In 1946 she was Vice Chairman of the United States delegation to the International Health Conference and in 1949 she became Assistant Director General for Advisory Services in WHO In 1951 she returned to the USA to become Chief of the Children's Bureau but resigned from this post in 1956 to become Professor of Maternal and Child Health at the Harvard University School of Public Health She is a member of the WHO Expert Advisory Panel on Maternal and Child Health

Miss Orbell was nurse-consultant in charge of post basic courses at the College of Nursing, New Delhi India from 1951 to 1953 under the Colombo Plan For the next six years she was a nurse instructor at the Post Graduate School for Nurses in Wellington New Zealand and then went to Boston University USA for a year's advanced course in nursing education on a New Zealand Government fellowship

Maternal and child health

Two public health nurses from Thailand have joined the field staff of WHO in the Kingdom of Laos to help train local personnel for maternal

and child health work. They are Miss Sakorn Arunaveja and Miss Vana Satsara. The other members of the WHO team are a medical officer and a senior nurse educator.

Miss Arunaveja obtained her nursing diploma from McCormick Hospital, Chuengmai, and her diploma in midwifery and public health from the Red Cross Hospital, Bangkok. She has also done post graduate studies at the School of Nursing in Wellington, New Zealand. From 1954 to 1956 she was Superintendent of the Midwifery School at Chuengmai and more recently she was school nurse at the maternity and child health training centre in Bangkok.

Before joining WHO, Miss Satsara was Assistant Director of the School of Midwifery, Hua Chiao Hospital, Bangkok. She received her certificate of nursing, midwifery and public health from the Thai Red Cross Society's School of Nursing, and her certificate in public health nursing from the College of Nursing, Philippine Women's University, Manila.

Changes at WHO Headquarters

On 1 July 1960 the two existing units of the Division of Malaria Eradication at WHO Headquarters—Malaria Eradication Planning

and Malaria Eradication Programme—were dissolved and replaced by three new units. The titles of these units are Planning and Programme Research and Technical Intelligence, Epidemiological Assessment. Dr E. B. Weeks is Chief Medical Officer of Planning and Programme and Dr L. J. Bruce Chwatt, Chief Medical Officer of Research and Technical Intelligence. The Chief Medical Officer of Epidemiological Assessment has not yet been chosen. The Malaria Advisers' Pool is to be progressively reduced in size and will be finally disbanded when reassignments have been offered to those now serving in it.

Dr S. Btesh, of Israel, has been appointed to succeed Dr A. L. Bravo as Chief Medical Officer of the recently established Organization of Medical Care unit. Dr Btesh obtained his medical degree at the American University of Beirut and has taken post graduate courses at London and Edinburgh and at the Johns Hopkins School of Public Health, Baltimore, Md. He was for six years Director General of the Ministry of Health, Israel, and prior to that held various senior hospital and public health posts in Israel. He has wide public health and hospital experience, has represented his government at the World Health Assembly and is a member of the WHO Expert Advisory Panel on Organization of Medical Care.

See *WHO Chronicle* 1960 14 334

Review of WHO Publications

Child Guidance Centres by D. Buckle and S. Lebovici, Geneva 1960 (*World Health Organization Monograph Series* No. 40) 133 pp. Price £1 \$4— or Sw. Fr. 12.— Also published in French and Spanish.

The World Health Organization has recently published an English translation of a study on child guidance centres which originally appeared in French in 1958. The authors, a psychologist and a psychiatrist, have sought to cover as wide a range as possible by drawing on the proceedings of a seminar which was held in 1956 in Lausanne under the auspices of the WHO Regional Office for Europe, and to consider the functions of

child guidance clinics and their relationship to other social services. This monograph thus reflects the various opinions held on this subject and considers the organization of child guidance centres from many different viewpoints.

Child guidance centres were started in the USA at the beginning of this century and have since grown in both number and complexity. They were originally intended to deal with problems of juvenile delinquency; today they are an essential part of social and medical services dealing with all children or adolescents who, for one reason or another, are not fully adjusted to their environment.

The term guidance has been retained in the name of these centres because of its historical connexion with their development although it no longer adequately describes their philosophy. They do not merely redirect the maladjusted child—a task performed by many other bodies as well—but seek to effect a change in his personality and psychological structure so that whatever is inhibiting his development may be eliminated.

One of the most important first measures in child guidance is history taking for both the diagnosis and the treatment are dependent on it. Indeed it is often even of therapeutic value in itself. Parents who bring a child to a guidance centre inevitably do so at a time of intense family drama and the patient questioning of the guidance team may both loosen family tension and bring the parents to realize the consequences of their attitudes which are often the fruit of their own childhood experiences.

History taking must bring out two different kinds of information. It is necessary on the one hand to collect facts and dates concerning the family history in order to establish the train of critical events in the life of the child. On the other hand the complex nature of the interrelationship of child and parents makes it imperative to take into account data which are much more nebulous and yet of decisive importance.

In child guidance the diagnosis cannot be based merely on a group of symptoms which are but the external manifestations of behaviour disorders and which depend in any case on the child's age. It must be a synthesis of elements brought out in the history taking and is based on psychiatric, somatic, psychological and social studies.

The psychiatric study must include both the child and his parents. A child particularly a very young child cannot be directly questioned and his spontaneous utterances and actions are of great importance. The parents' personalities may generally be assessed in the preliminary interviews.

A somatic examination is indispensable and may be supplemented by laboratory tests and electroencephalography.

The object of the psychological examination is to assess the child's intellectual and emotional capacity. Quantitative tests should not be

applied as a matter of routine as the very choice of tests requires a certain initial diagnosis. Projective tests however may be valuable for verifying the psychologist's hypotheses concerning the child's psychology.

The study carried out by the social worker bears on the cultural and socio-economic conditions of the family, on the relationships within the family and on the relationships of the family—and of the child in particular—with its various environments.

A distinction must be made in diagnosis between temporary reactional disorders and chronic structural disorders. To this end it is necessary to collect all the information possible and at the same time to appreciate that all diagnosis or prognosis concerning a child is fraught with uncertainty. The most overt symptoms may be also the least enduring and their disappearance does not necessarily indicate cure for they may have been altered or displaced or given somatic expression on the other hand parents are more tolerant of cases of anxiety or inhibition, in which the child appears well behaved but runs a far greater risk in the future.

As a guide to later treatment the authors put forward a descriptive classification of behaviour disorders stressing however that it is not intended to take the place of diagnosis but to assist in reaching as full a diagnosis as possible.

The treatment methods adopted in child guidance centres do not exclude medicinal treatment but are different from traditional medicine in their approach. They fall into three main categories: (a) psychotherapeutic methods aimed at re-establishing healthy development in the child; (b) methods directed at reducing sources of disorder in the child's environment and particularly in the family; and (c) corrective or educational methods.

The psychotherapeutic methods now in use are almost all derived from psychoanalysis based on the child's expression of his conflicts both in play therapy and in his relationship with the therapist. Psychoanalysis itself is rarely resorted to for children. Work with the parents must be carried out simultaneously with psychotherapy of the child either as social case work or through group psychotherapy. After-care is vital in all cases.

At all stages of both diagnosis and treatment

all members of the staff of child guidance centres must work as a team in the closest co-operation. The basic members of the team are the psychologist, the child psychiatrist and the social worker, all of whom should have had post graduate training as should the other specialists—e.g. psychotherapists, physiotherapists and speech therapists—who may also be required. Whatever the composition of the team its members must act together as a cohesive and harmonious group with a life of its own and not merely as a loose aggregation of specialists.

It is considered that in many countries some 8% of all children need guidance treatment at one time or another. They represent therefore a problem of considerable magnitude and some selection of cases is consequently necessary. It is by no means universally agreed that the best equipped centres with the most highly qualified staff should concentrate on the most serious or hopeless cases which might easily tie up the services of the staff for long periods. From the point of view of the centre's value to the community it may be preferable to deal more rapidly and economically with less serious cases and with preventive work. Less serious or mild cases however should not be confused with easy cases. Treatment of mild disorders at their outset requires high technical skill and experience. Such mild disorders may be discovered by systematic case finding in, for instance, schools and holiday camps, but too much stress should not be laid on case finding if it is to result in a volume of work beyond the technical resources of the centre. For one fundamental principle to be observed is that any case brought to light should receive immediate attention.

The child guidance centre, it will be readily understood, must maintain very close relations with official and private bodies in its community which deal with the physical and mental health and the education of children. It also has important functions in connexion with the education of parents, the training of technical personnel and research.

There are several annexes to this monograph, the first of which deals with psychoanalytic concepts of the affective development of the child and their integration into neurobiological and cultural data. Another goes into the manner in which a centre's records should be kept and

what information they should contain and a third gives the background of the seminar at Lausanne on the proceedings of which this book is based.

Differential Diagnosis of Yaws by C. J. Hackett and L. J. A. Loewenthal. Geneva 1960 (*World Health Organization Monograph Series* No. 45). 88 pages. Price 17/6 \$3.50 or Sw. fr. 10.— French and Spanish editions in preparation.

As progress is made in yaws eradication in many countries it becomes increasingly important to be able to differentiate as clearly as possible between skin and other lesions not caused by yaws and those yaws lesions which they may closely resemble. At all stages of a mass campaign for the eradication of yaws the clinical diagnosis should of course be as accurate as circumstances permit. However in view of the limited time available at initial treatment surveys and of the simple training of necessity given to many of the field staff, a certain proportion of diagnoses—probably about 10%—may be expected to be erroneous. Such errors are all the easier to make as the skin has a limited number of reaction patterns so that similar lesions may result from different causes. In the later stages of an eradication campaign the manifestations of yaws have largely disappeared as a result of mass treatment with penicillin. It is then that many lesions not due to yaws become prominent and at this stage accuracy of diagnosis assumes particular importance.

The lesions of yaws were fully illustrated in C. J. Hackett's *An International Nomenclature of Yaws Lesions* published by the World Health Organization in 1957. The present monograph written by the same author in collaboration with Dr L. J. A. Loewenthal, is intended as a companion volume to that earlier publication and was prepared in response to requests for an illustrated handbook which would assist field workers in making accurate diagnoses.

Only illustrations of lesions likely to cause confusion with yaws have been selected and special attention has been paid to lesions of the palms and soles as these seem to be the least understood and the most troublesome. To facilitate comparison between similar lesions of

dissimilar etiology there are numerous cross references from the 52 full page photographs in this monograph to those in *An International Nomenclature of Yaws Lesions*

In an annex the authors discuss two types of plantar lesion—originally described as keratoma plantare sulcatum and keratoderma punctata—which have been referred to in the literature of tropical medicine by a variety of names and about the cause of which considerable confusion has arisen

Annual Epidemiological and Vital Statistics 1957

Geneva 1960 669 pages Bilingual publication (English and French) Price £3 \$12 00 or Sw fr 36—

This is the tenth in the series of *Annual Epidemiological and Vital Statistics* reports published by WHO since 1948 The nine previous volumes covered the years 1939 1946 1947 1949 and each of the years 1950 to 1956 This volume follows only six months after the previous one Its publication has been accelerated to provide the reader with the most recent information available in consequence no new features have been introduced

The statistics published are the result of a common effort by national health and statistical administrations by the Statistical Office of the United Nations and by WHO All data were obtained from official sources being taken from the statistical reports published periodically by the various national health administrations or obtained by means of questionnaires Some were made available through the close co operation of the Statistical Office of the United Nations

Data on prophylactic vaccinations have been omitted because most of them have already been published for the year 1957 in the previous volume or are available in the monthly issues of the *Epidemiological and Vital Statistics Report*

The table giving the number of physicians according to their medical specialty which was published for the first time in the previous volume has also been omitted this has been done because no significant changes occur annually in these figures and this information is available at long intervals only for most countries

Offprints have been produced of the tables on causes of death that have wide interest, such as malignant neoplasms cardiovascular diseases accidents and infant deaths An offprint has also been made of the table giving death rates by all single categories of the Abbreviated B List of the International Classification and of the tables in Part III (health personnel and hospitals) These offprints are available to students of these special subjects

The Comparative Pharmacology of Some Psychotropic Drugs by E Jacobsen (Offprint from *Bulletin of the World Health Organization* 1960 21 411 495) Price 5s \$1 00 or Sw fr 3—

The number of chemical compounds with an effect on the higher centres of the central nervous system has greatly increased in recent years and the remarkable properties of some of them have aroused much interest in their mode of action which is now better understood because of improved knowledge of the physiology of the central nervous system The paper examines systematically the effects of some of the better known of these psychotropic drugs on the various levels of the central nervous system their antagonistic and synergistic effects and the relationship between these effects and the effects on other functional systems and on behaviour Although the picture revealed is very complex and there are many gaps psychotropic drugs fall into certain classes according to the effects they have and a system of classification could be developed on this basis

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WORLD HEALTH ORGANIZATION

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PUBLIC HEALTH EDUCATION AND RADIATION HAZARDS

D M G Caccia Director-General of WHO gave an address on public health education in relation to atomic energy and radiation hazards at a meeting held by the Royal Society of Health in London on 4 April 1960. Text of this address is reproduced by permission of the Royal Society of Health from their Journal (1960 80 3)

There exists today in many countries a remarkable interest in health questions related to ionizing radiation. And in the face of modern developments this concern is easily understandable. Radiation radioactivity and atomic energy present a very great and rapidly growing challenge in public health.

What is often not realized, however, is that more is known today about ionizing radiation than about almost any other important environmental or industrial hazard. A great deal of experience and information on the effects of radiation on human beings has been accumulated. X-rays and radium have been used in medicine since the turn of the century and a great deal has been learned from other sources such as through the unfortunate early experiences with radium in the luminizing industry.

Birth of atomic energy

Against this background of knowledge deepened by research in radiobiology and the metabolism of natural and accelerator produced radionuclides, atomic energy was born some 18 years ago. From the health point of view, the birth of the atomic energy industry was unique because from the very beginning there existed a realistic appreciation of the very great potential health hazards which would accompany it. It was realized that large amounts of radiation would be involved, that new types of radioactive elements would be produced and more important, that the creation of vast quantities of radioactivity would be associated with uranium fission on a large scale. There was an awareness that exceedingly great precautions would have to be taken for health protection.

The new atomic energy developments stimulated a marked intensification of studies on the biological effects of radiation and the behaviour of radioactive materials in the environment and in the body. And so over the years we have built up a relatively substantial understanding of radiation health problems.

Even in the realm of a very low level irradiation where our knowledge is most meagre we are not at a complete loss. We know that since the beginning of his life on this planet man has been bathed in cosmic radiation and exposed to the gamma rays from natural radioactivity in the earth's crust; he has been inhaling the natural radioactivity of the atmosphere and been bombarded by the alpha and beta particles and gamma radiation from the radioactive elements of his own body tissues. We know something about the intensity and nature of this natural radiation and its fluctuations. And this provides us with a valuable yardstick with which to compare our newer man-made sources of radiation exposure.

We are keenly aware of our need for much more complete and fundamental knowledge in this field. That we can in fact evaluate and take into account radiation hazards more adequately than we can many others connected with modern life is an indication not of any truly deep understanding of radiation but of our ignorance in regard to other everyday industrial and environmental hazards.

Widespread use of radiation

If the radiation problem with which we are concerned stemmed simply from atomic energy activities, the matter would not be so

difficult. Actually, the public health concern is very much wider. While it includes atomic energy it is related more generally to the widespread diffuse and rapidly expanding use of X rays, radioactive material and other sources of ionizing radiation in all sorts of activities—in agriculture, mining, atomic energy, industry, medicine, colleges and universities and various other enterprises both large and small. The use of radiation and radioactivity is part of everyday life in many countries and is becoming more so all the time.

Because the problems are varied, many different disciplines are involved. The disposal of radioactive waste from laboratories, hospitals, industries and atomic energy installations clearly involves sanitary engineering. Accidents in industrial and atomic energy installations or in the transport of radioactive materials may provide urgent and very complex public health problems calling for assistance from many groups of workers.

Economically valuable uses of radioactivity cannot be safely introduced or exploited in any country unless there is sound preparation of health safeguards and unless the public health authorities and personnel have the awareness, competence and preparation to fulfil their responsibilities in both routine and emergency situations. The same is true for atomic energy developments. It has become necessary today for physicians, public health officers, nurses, sanitary engineers, health educationists, industrial hygienists and other groups concerned with health to know much more about radioactivity, ionizing radiation and atomic energy.

Public health education

How is public health education and training in this field best handled? Surely no single way is adequate. One of the most characteristic features of radiation health is the degree to which the physical and biological sciences must together be brought to bear on the questions involved. This interdisciplinary nature of the field presents special difficulties in connexion with training.

The person broadly competent in radiation

health must be soundly based in physics, biology, chemistry and medicine. It is unrealistic at the moment to ask for large numbers of such individuals in any country. Access to such competence, however, is necessary. The bulk of radiation health work in practice is carried out by persons from different training backgrounds. This is an area characterized by close co-operation and team work between physicians, engineers and physicists. It is a composite field made up of many approaches and activities dealing with a wide spectrum of problems. A very real structure and unity does exist, however, and nowhere is this more clear than in public health.

The educational roots lie far back in the undergraduate curriculum where scientific foundations are laid and where any artificial division between the physical sciences and biology must be bridged. Radiation medicine and radiation pathology should be taken fully into account during the course of professional training in any modern medical school and the graduating doctor should have a basic understanding of these questions.

Special training is required at the post-graduate level. It is here that both the details and the broad public health view must be developed. Here radiation health takes real form as its various aspects fall into perspective.

One of the constantly recurring complaints about the medical curriculum is that it is overcrowded and lacking in coherence. The enormous increase during the past generation in the subject matter of scientific medicine has raised issues which are difficult to solve. In the undergraduate curriculum there is a potential danger that the introduction of too many subjects will lead the student into acquiring a mere smattering of knowledge without any depth or real understanding.

The selection of subjects is increasingly difficult because each expert teacher is naturally anxious to secure as much time as possible to present his own material and is not inclined to show any great solicitude for his colleagues who are equally anxious to push their own subjects. Yet this knot must somehow be untied and a compromise

reached. What are the principles on which we should progress towards this aim?

The first point is that new knowledge which is of importance to the health of people in the future and can be effectively applied to prevent risks must somehow receive priority. In many academic institutions the undergraduate curriculum is admittedly over-crowded with detail but it is not enough simply to meet these difficulties by reducing the quantity of facts poured into the student from all sides.

The second point is that it would be no solution merely to withdraw the teaching of the basic sciences and introduce a whole series of disconnected bedtime stories about antibiotics, cardiac surgery or the hazards of radiation. One of the essential requirements is to link every subject of vital importance with one at least of the fundamental sciences. In other words, teaching must be structurally connected so that each subject has a foundation on which it can stand.

Two special courses

The World Health Organization has given specific attention to the question of training in radiation health. I would like to refer here especially to two studies of expert committees in the education field: one¹ dealt with post-graduate training in the public health aspects of nuclear energy and the other² examined the introduction of radiation medicine into the undergraduate curriculum. It would be logical to take the basic undergraduate course first.

As we become increasingly aware of the load already placed on the shoulders of the undergraduate student in medicine, nursing and the allied professions, we can find a place for the new knowledge only by some revision of the existing curricula, and in each case we must ask ourselves what will have a real value for the student in later professional life. To take as an example the medical course: on what matters of public concern and anxiety will the family doctor be expected to give advice and establish confidence? It is clear

that in the preliminary period of education some further emphasis must be laid on the concepts of fundamental science. Basic physics at this stage is a rich source for illustration and as the Expert Committee pointed out:

"The recent advances in nuclear physics are among the most revolutionary developments in thought that have been experienced by our generation and a general acquaintance with them must therefore form an essential part of the education of every cultured person."

The Expert Committee prepared a brief schedule of topics recommended to be included in a pre-clinical course in physics. I lay some stress on this because with minor variations it would apply to training for other professional workers in the health field, especially when reinforced by practical illustrations suited to the individual professions such as nursing or sanitary engineering. The principal items are:

(i) the nature of radiations and their relation to the structure of matter

(ii) physical, chemical and biological effects of radiations, with particular reference to their technical applications in medicine and their injurious effects on somatic and germ cells

(iii) detection and measurement of radiation: instruments and units

(iv) natural sources of radiation (internal and external)

(v) artificial sources of radiation—apparatus for the emission of ionizing radiation and radioactive isotopes

(vi) chemical properties of some elements with important radioactive isotopes, such as germanium, rubidium, strontium, xenon and caesium, whose stable isotopes are unfamiliar in biochemistry

(vii) the principal applications of radiations in biology and medicine

(viii) the more important radiation hazards: aspects of protection and prevention

When training passes into the more strictly professional phase, a progressive deviation in the material of teaching may take

place. Some subjects are of such universal importance to an understanding of the problem that they should be dealt with specifically. The most important of these are genetics, radiation physiology and relevant aspects of biochemistry.

It is not for me to go into the clinical period in the teaching of medicine or nursing or the corresponding advanced training of the sanitary engineer. Enough to say that both the personal and the genetic risks of radiation must be emphasized and that a sound practical knowledge of protective measures must be fully understood. The essential point is that the members of the health team will be asked questions by a public brought up on the fodder provided by the daily newspapers, television and cinema. What is more, the student must be taught by illustrations which will enable him to go one better than the lay press in meeting public needs and allaying unnecessary fears. If his own teaching is skilfully reinforced by visual aids, experiments and visits to actual installations, he will be well equipped to speak with authority.

We ought not to underestimate the critical force of public opinion, even in an age which takes so many of its emotions in a kind of two dimensional way. When it comes to a crisis, the ignorant will be found out and the people will follow the lead of knowledge.

When we come to the post graduate period, the problem of training is in some respects simpler. Before very long all students who have passed through professional training in the field of health will have acquired some general knowledge of radiobiology. In all branches of public health study they will be equipped to handle the more strictly public health challenge of radiation.

Four instructional levels

In post graduate teaching the Expert Committee recognized four instructional levels. At each level they considered the subjects under five main headings: physical principles, biological principles, applications of radiation, radioisotopes and nuclear energy, hazards and protection. It would be well

worth while for those who are concerned with planning courses to examine these four levels as they can be applied to staff members of a health department who have different responsibilities and different backgrounds of experience.

At the first level there would be an *orientation course* suitable as a basic course for all types of health personnel who do not necessarily have specific duties to perform in regard to radiation. It would consist of about six to eight lectures linked as far as possible with other teaching subjects. Emphasis would be laid on the practical aspects of hazards and protection. This course would be designed for industrial and general nurses, hospital administrators, health educators and sanitarians.

At the second level an *introductory course* would be appropriate as a basic curriculum for industrial medical officers, sanitary engineers and inspectors and biostatisticians and as a further course for medical and veterinary officers who were not expected to have any special responsibility in radiation. It might occupy about 60 hours if given during full time graduate studies or two weeks if designed as a special concentrated course. In addition to lectures, opportunity would be given for group discussions and practical exercises. Instruments and equipment would be shown as well as specially designed films.

The *advanced course* would be designed for medical officers with a definite responsibility in radiation and atomic energy activities, industrial and sanitary engineers, physicists in the health and hospital services and biostatisticians. The duration would be approximately 120 hours if given during regular graduate studies or four weeks as a special concentrated class. Both academic and practical work would be included and arrangements made for field visits.

The *specialist course* is much more highly powered and is intended for persons with professional backgrounds in science, engineering or medicine who will have special responsibilities in the radiation field or atomic energy. The Expert Committee did not recommend a specific duration for the

course but it clearly had in mind at least an academic year of full time graduate studies. A specialist course of this kind would be quite unsuitable for short term concentration.

Special needs

Another feature of the specialist course is that it might have to be planned on a more or less individual basis to meet the special needs of restricted groups. Some of these would undoubtedly have to concentrate on experimental work in their own spheres and both laboratory work and practical training would have to be arranged accordingly.

It should be borne in mind that post graduate training cannot be considered in isolation from either undergraduate training or the general education of the public. All the members of the staff of a public health department are likely to have to deal with some aspect of radiation or nuclear energy. Public health workers will also be responsible in varying degrees for making recommendations to their authorities on the health and safety aspects of ionizing radiation and radioactivity.

The health officer will be responsible for assessing the effects of radiation exposure on the general population not directly concerned with handling and using radioactive materials. He may well be the first source of information and advice on the health and safety of workers engaged in work connected with radiation. Secondly the health officer will be called upon to advise on the safe use of radiation including X rays for both diagnosis and treatment and in its use in industry. The sanitary engineer will also be concerned with levels of radioactivity encountered in the environment. Other members of the public health team will be charged with the duty of public information and it may be soothing the apprehensive and over-excited.

For all these purposes it is essential that the post graduate training of the public health officer should provide information on which he can teach and act and deal with emergencies. He must be an authority on all the community implications of atomic energy and no less on the negative aspects such as

protection of hospital staffs of industrial workers and of the community as a whole in the event of local accidents or major catastrophes.

In view of all these considerations the comprehensive training of the health officer and the potential members of his team becomes of outstanding importance. The principal members of this team are the medical officer of health the public health nurse the sanitary engineer and colleagues in environmental sanitation. This does not cover the list of those who require training in radiation health one immediately thinks of industrial hygiene workers veterinary public health officers and laboratory and other technical personnel. There are many other grades of health workers who have important duties in this connexion. One should make special reference to those whose function it is to educate public opinion to provide authentic knowledge and at the same time help to dispel irrational anxieties. This is not merely a technical function but a problem of supporting moral and spiritual strength.

Conclusion

In this short paper I have tried simply to do two things and much of the detail of teaching in radiobiology has had perforce to be omitted. First I have attempted to give some indication of the constantly enlarging interests of the World Health Organization in the entire sphere of radiation and the health aspects of atomic energy. I have also tried to make it clear that my subject has been limited to the health aspects of teaching and practice without attempting to range widely over the general field. In the second place I have tried to show the essentials of a series of teaching programmes recommended by our experts. Their work is very recent and their standing both in public health and in the medical aspects of radiation and atomic energy is very high indeed.

We in the World Health Organization rely a great deal upon the system of bringing together for a period of perhaps a week or ten days groups of experts in specific subjects

We make special efforts to get their advice on the subjects of tomorrow rather than the findings of yesterday. I know well that you all realize the great and urgent importance of studies of this kind and the need for all members of the public health profession to be kept thoroughly informed on pertinent developments in the rapidly moving health sciences. It is only in this way that they can win con-

fidence and prevent complacency on the one hand and the equally dangerous panic on the other.

The whole situation has been summed up very well by Shakespeare with his usual masterly touch:

If it be now tis not to come if it be not to come it will be now the readiness is all
(Hamlet V ii 232)

COMMUNITY WATER SUPPLIES IN THE MEDITERRANEAN AREA

In 1959 the Twelfth World Health Assembly discussed a report by the Director General¹ in which he advanced the thesis that WHO had dispersed its efforts in environmental sanitation over too wide a front and should in future concentrate on a more limited objective. A satisfactory programme with such an objective should fulfil all or most of a number of criteria: it should be of ready appeal, give a reasonable expectation of being easily and promptly carried out, exact the minimum amount of time and energy, confer the greatest possible advantages in terms of public health, comfort and economic return, require little health education and need little or no research. What environmental sanitation programmes best met these criteria? Only community water supplies and community sewerage, and of these the former had the more dramatic and universal appeal.

The Assembly endorsed the Director General's views and urged that priority be given in national programmes to the provision of safe and adequate domestic water supplies. WHO opened a special fund to assist governments in developing community water supplies and to co-ordinate the work throughout the world by providing the technical and advisory services required and collaborating with whatever agencies were interested.

In December 1959 WHO sponsored a seminar on community water supply in the Mediterranean area, attended by represen-

tatives of various governments of the US, International Co-operation Administration (ICA) and of the International Water Supply Association (IWSA). Its aim was to examine the latest information on the organization, financing, management and control of community water supplies and to exchange views on methods of stimulating the construction of new systems and the improvement of existing ones. The seminar, as the WHO Regional Director for the European Region remarked in the opening address, was the first practical manifestation of the World Health Assembly's desire for action to provide community water supplies and had arisen from the request of the Regional Committee for Europe for stimulus and leadership in this field. The Committee had recognized that while the majority of the cities in the Region are now provided with adequate and safe supplies of water, considerable numbers of smaller communities still do not have them. Supplementary sources of water should be developed, therefore, but existing sources also need to be extended as well as maintained and operated with care, for as urbanization and industrialization develop, water is being consumed in increasing quantities and there is at the same time greater danger that sources will be polluted.

Even if its use in industry is excluded, the daily consumption of water in the modern community is several hundred litres per head (as compared with only a few litres per head in a primitive community) and the effects on the social, economic and health conditions of the people are incalculable. There is a great

¹ See WHO *Ch. I* 1959 13 309
This article is based on the seminar report (unpublished document MHO/PA/39 60)

saving of time if water is freely available the time of mothers who can concentrate on better home and child care and of fathers who can increase their working capacity and produce and earn more. Besides its use for personal and domestic cleanliness water has a marked influence on other aspects of public health. In California for example it was found in 1952-1953 that the extent to which water was available bore a direct relationship to the incidence of *Shigella* infection in migrant workers. This finding was confirmed in Brazil in 1956 where it appeared as well that mortality from diarrhoea in infants under 4 months of age was 60-70% among families who had to fetch their water from unprotected wells or public faucets whereas among families who had water laid on in the house it was only 20%.

There is no quick and easy way of providing a community with adequate and safe water supplies: hard work will be needed. Conflicts of interest will occur between ministries and departments: legal and organizational readjustments will provide stumbling blocks throughout the complicated administrative, financial and managerial operations involved. Personnel problems will be acute. It will be necessary to break down the tradition of free water in many places, a tradition that dates back to before the days of aqueducts, pumps or purification works. It must be replaced by the realization that when public water supplies are developed and made safe they cost money and that operation and maintenance also cost money. This money must come from somewhere. According to one participant in the seminar there is more available even in the less developed countries than is generally thought. The scarcity of adequate water supplies is not always due to poverty but often to inertia, neglect, lack of understanding of the way to go about providing them, failure to appreciate the theory and practice of self liquidating investments and other aspects of public finance or even a disposition to spend available funds on other perhaps less worthy projects. Money is often being spent wastefully on providing water and could be spent more profitably if the officials concerned were shown how

Another participant stressed the need for hastening slowly. In Amsterdam (he said) the water supply before 1850 depended on public and private wells and on water brought by boat from a distant river. In 1851 a piped supply was installed by a private company and most households got their water from stand pipes and paid per pail. Gradually the piped supply was introduced into houses and by the end of the century almost all houses had it and the average daily consumption per head—at first not more than 20 litres—slowly rose with the introduction of modern appliances. In his view the path followed elsewhere should be the same one. People would have to become familiar with the new way of living. If the system grew too fast the financial consequences would prove too heavy a burden on the community. This participant then worked out the running costs for a community of 100 000 starting with a daily consumption of 20 litres per head and reaching 100 litres in 50 years and 200-400 in 100 years. For a family of four consuming 20 litres in the initial years and then 50 litres the daily expenditure would be 1½ and then 2½ US cents per head, not an excessive amount for a primary need.

The seminar discussed a large number of subjects of vital importance in any programme of community water supplies: the organization of national programmes, the estimation of capital requirements, methods of financing, the early steps to be taken in implementing a national programme, the establishment of equitable and adequate water rates, the relative functions of public health and public works agencies, the considerations involved in establishing minimum design criteria, the control of the quality of water systems, of waterworks operation and management, and education and training in connexion with the community water supply programme. The role of WHO and other international agencies in the national programme was outlined and an ICA representative spoke about ICA plans and activities.

The discussions of the seminar did not stop at generalities but went into details. On the controversial subject of water rates for

example there was a discussion on the over all objectives of these rates (the provision of sufficient revenue for the operation maintenance development and perpetuation of the water supply the promotion of rational economic water consumption and the prevention of wastage and the just allocation of charges between consumers and property owners) on the metering of domestic supplies on sliding and reverse sliding scales on the calculation of gross revenue requirements and on the allocation of charges in the collection of the rates. The discussion on control of the quality of water ranged over criteria for judging sanitary quality exploratory surveys the analysis of the water ground and surface waters water supply systems using treated and untreated water disinfection clarification and adjustment of the chemical properties of the water limit concentrations and the expression of results.

The seminar had no doubt that community water supplies would benefit the economic and social conditions as well as the health of a community. They would lead to an improvement of the worker's health and so to increased productivity reduce industrial absenteeism and by preventing disease help reduce the weight of taxation required to support medical services. They would give greater leisure and impart the personal pride and self respect afforded by clean bodies and a clean home. One participant suggested indeed that once the women in the country from which he came were relieved of the burden of carrying water their status and dignity would be enormously increased for donkeys and women did all the carrying and there was a tendency to place them in the same category. Another suggestion was that the changed pattern of life might lead to some mental stress but this was accepted as a purely temporary phenomenon if it occurs at all. The mental health aspect it was agreed is of great importance but little is known about it and it deserves study by health educators mental health workers and sociologists. One feature of it is psychological resistance to the installation of water in the home. It is generally thought that the benefits of water supplies are so self evident

that people will welcome them into the home with joy. This is normally but not invariably true in some areas there is a superstitious objection to water under pressure.

There was unanimous agreement that a national water supply programme should be administered by a single well organized national agency. This agency would *inter alia* control water resources to ensure their rational use and if necessary allocate water to communities look after the development of water resources in communities plan and study financing methods implement plans in the early stages assist in setting up managing boards in the communities devise and administer a national plan and perhaps even arrange the financing and carry out part of the plan according to local conditions.

An accurate estimate of the cost of a project is of vital importance to its financing and therefore to its acceptance by a community. Many factors enter into this estimate some of which are not fully appreciated. They include preliminary surveys by engineers and other specialists the cost of the land for the reservoir buildings etc rights-of-way and legal costs appertaining thereto the cost of raising capital interest on borrowed money the actual construction cost fees for the consulting engineers and other specialists the operating costs until the scheme begins to earn revenue and the inevitable miscellaneous expenditure. In planning the undertaking it must be constantly kept in mind that it should be a self liquidating investment.

The health authorities should be required to review and approve plans for water supplies. There should also be the maximum collaboration with other governmental agencies involved and here a national advisory committee might be useful both to associate representatives of these agencies with the work and to procure the advice of influential members of the public.

The provision and design of a waterworks depend on a number of considerations. Among these are the availability of money the economic circumstances of the community the question whether the project can be accomplished in stages so that the expenditure is spread over a prolonged period.

simplicity (unnecessary automatic devices must be eliminated) ease of operation the standard of skilled and unskilled labour the quality of the materials the availability of equipment and spare parts the anticipated growth of the area the possible future demand for water and the social conditions customs and traditions of the area

An immense educational effort is needed to persuade all the interests involved that it is to their advantage to co-operate in the provision of community water supplies. The financial interests must be induced to invest on the ground that an adequate water supply will improve the community's health prevent drift away from the community attract industry and make agriculture more prosperous. They must be shown that the investment is secure and offers a reasonable rate of return and that the debt will be satisfactorily extinguished in due course. One suggested approach would be to prepare a list of

waterworks in each country that are successfully operating as self liquidating investments. A guarantee by governments that loans would be repaid would be an enormous attraction to investors. The co-operation of interested international agencies should also be sought of the UN FAO ILO UNESCO the World Bank ICA and others. Finally those countries that have expressed an interest in granting commercial and manufacturing assistance to foreign countries should be encouraged to help on the ground that they would gain credit for humanitarian motives acquire prestige benefit mankind and at the same time receive an adequate return for their investments. But each country should start work on community water supplies without relying on WHO or other agencies. It should furnish a practical demonstration of what can be done and the effect will perhaps result in a spirit of emulation that will lead to an extension of the programme.

INTERNATIONAL MEDICAL RESEARCH

In a paper presented to the American Public Health Association¹ on problems in developing international health programmes Dr M G Candau Director General World Health Organization discussed research. Research he said is becoming one of the most important activities of WHO and this provides many further examples of the dynamic nature of the organization's programs. The original constitutional mandate given to WHO included the promotion and stimulation of medical research but in the practical day-to-day work of the first years the importance of research was to some extent obscured. Faced with serious financial limitations WHO's effort concentrated on helping governments to control the major communicable diseases. Paradoxically every step forward in the fight against these major communicable diseases revealed gaps in

knowledge as well as deficiencies in the method and techniques used against them. It became increasingly evident that research was the only means of overcoming these shortcomings which threatened to jeopardize every campaign however well conceived and carried out.

"By the end of the first decade of WHO's work the indications were that progress in world health in the coming decade would depend to a great extent on our ability to develop to the fullest the resources remaining unexploited in the world for the promotion of medical research. It is to the credit of the United States Delegation at the Eleventh World Health Assembly in Minneapolis that the question of WHO's responsibility in this field was raised openly and thanks to the unanimous stand taken by the Assembly we have now a blueprint defining the areas in which WHO can and should develop an intensified research program.

Here I should like to reiterate that we can

¹ C. da M. G. (1960) *Am. J. Publ. H.* 50: 4, 6.
 Suppl. p. 3. The text from the paper quoted by J. D.
 permission of the American Journal of Public Health.

example there was a discussion on the over all objectives of these rates (the provision of sufficient revenue for the operation maintenance development and perpetuation of the water supply the promotion of rational economic water consumption and the prevention of wastage and the just allocation of charges between consumers and property owners) on the metering of domestic supplies on sliding and reverse sliding scales on the calculation of gross revenue requirements and on the allocation of charges in the collection of the rates. The discussion on control of the quality of water ranged over criteria for judging sanitary quality exploratory surveys the analysis of the water ground and surface waters water supply systems using treated and untreated water disinfection clarification and adjustment of the chemical properties of the water limit concentrations and the expression of results.

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The health authorities should be required to review and approve plans for water supplies. There should also be the maximum collaboration with other governmental agencies involved and here a national advisory committee might be useful both to associate representatives of these agencies with the work and to procure the advice of influential members of the public.

The provision and design of a waterworks depend on a number of considerations. Among these are the availability of money the economic circumstances of the community the question whether the project can be accomplished in stages so that the expenditure is spread over a prolonged period

simplicity (unnecessary automatic devices might be eliminated) ease of operation the standard of skilled and unskilled labour the quality of the materials the availability of equipment and spare parts the anticipated growth of the area the possible future demand for water and the social conditions customs and traditions of the area

An immense educational effort is needed to persuade all the interests involved that it is to their advantage to co operate in the provision of community water supplies The financial interests must be induced to invest on the ground that an adequate water supply will improve the community's health prevent drift away from the community attract industry and make agriculture more prosperous They must be shown that the investment is secure and offers a reasonable rate of return and that the debt will be satisfactorily extinguished in due course One suggested approach would be to prepare a list of

waterworks in each country that are successfully operating as self liquidating investments A guarantee by governments that loans would be repaid would be an enormous attraction to investors The co-operation of interested international agencies should also be sought of the UN FAO ILO UNESCO the World Bank ICA and others Finally those countries that have expressed an interest in granting commercial and manufacturing assistance to foreign countries should be encouraged to help on the ground that they would gain credit for humanitarian motives acquire prestige benefit mankind and at the same time receive an adequate return for their investments But each country should start work on community water supplies without relying on WHO or other agencies It should furnish a practical demonstration of what can be done and the effect will perhaps result in a spirit of emulation that will lead to an extension of the programme

INTERNATIONAL MEDICAL RESEARCH

In a paper presented to the American Public Health Association¹ on problems in developing international health programmes Dr M G Candau Director General World Health Organization discussed research "Research he said is becoming one of the most important activities of WHO and thus provides many further examples of the dynamic nature of the organization's programs The original constitutional mandate given to WHO included the promotion and stimulation of medical research but in the practical day-to-day work of the first years the importance of research was to some extent obscured Faced with serious financial limitations WHO's effort concentrated on helping governments to control the major communicable diseases Paradoxically every step forward in the fight against these major communicable diseases revealed gaps in

knowledge as well as deficiencies in the methods and technics used against them It became increasingly evident that research was the only means of overcoming these shortcomings which threatened to jeopardize every campaign however well conceived and carried out

"By the end of the first decade of WHO's work the indications were that progress in world health in the coming decade would depend to a great extent on our ability to develop to the fullest the resources remaining unexploited in the world for the promotion of medical research It is to the credit of the United States Delegation at the Eleventh World Health Assembly in Minneapolis that the question of WHO's responsibility in this field was raised openly and thanks to the unanimous stand taken by the Assembly we have now a blueprint defining the areas in which WHO can and should develop an intensified research program

"Here I should like to reiterate that we con

¹ C d M G (1960) *Am J publ Hlth* 50 N 6
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tinue to believe that research is and should remain a predominantly national responsibility and that it is the individual research worker who is at the heart of every scientific investigation. It follows that successful research depends upon the freedom of the individual research worker to develop his own potential and his ideas. As in the past WHO will refrain from undertaking research on its own or any action which might lead to duplication or overlapping.

Our primary purpose is to bring together the various research activities going on in many countries. The need for coordination has become more pressing because of the accelerated speed and enlarged scope research has acquired in a few countries as in the United States for example. We hope that the communications we shall establish between research workers of the world will reveal the gaps and single out the shortcomings and limitations of present day research when it is examined from a global viewpoint, that it will stimulate the formation of potential nuclei of research which until now could not be developed because of lack of manpower or of money or both.

As we see it the fields of research where WHO can usefully play a part fall into a few broad categories. There are first the problems which can only be examined on a world level such as demographic studies and statistical data on the prevalence of diseases old and new throughout the world. The second category includes communicable diseases which are either of a world wide character or so widely spread over several regions that they would yield only to a co-operative effort. Virus diseases and tuberculosis fall into the first group while malaria is characteristic of the second.

Another group of diseases logically suited for internationally co-ordinated research are those which present unexplained variations both in incidence and prevalence according to geographic economic and social conditions. The comparative study of such diseases—and I would mention cancer rheumatism cardiovascular disease diabetes—may very well provide us with a clue to the general causes of these diseases.

Sometimes the investigation of a very rare affliction in a remote spot of the globe may be of interest to all countries. Thus the study of pulmonary hypertension as reported in the Andes among people living above 12 000 feet might explain the mechanism of pulmonary hypertension in general.

Lastly international assistance in the form of training money or other facilities may enable countries to develop a research potential that has not been fully exploited because of lack of resources.

In intensifying its research programs WHO will by and large employ the same means as have been used in other branches of its work. There is first the training of research workers at all levels from the junior research student to the scholar who receives specialized supplementary training in some new skill.

Then there is the method that can be qualified as servicing research. This encompasses a variety of activities to enable research workers to communicate their knowledge to each other. Unless nomenclature definitions of disease techniques and material are standardized there is a risk that important research will remain of only local or arbitrary significance or even lead to frustrating and harmful misconceptions.

What kinds of problems in research face WHO? In 1959 the Twelfth World Health Assembly established an Advisory Committee on Medical Research. This Committee met for the second time in June 1960 and reviewed a series of reports papers and programme proposals on research in the following subjects:

Treponematoses

Interest in the field of treponematoses research the Committee agreed has declined since the introduction of effective antibiotic treatment. Nevertheless most of the fundamental problems remain unsolved. Pathogenic treponemes have not been cultivated—and until they are it will be difficult to determine when resistance to antibiotics emerges. Antigenic studies are rudimentary. Diagnostic serological tests are largely empirical. At the same time the picture of endemic treponematoses is changing, yaws is

disappearing and with its disappearance syphilis may spread. Little is known about the epidemiology of endemic treponematoses.

What could be done about this situation? Interest in basic research should be encouraged. Reference and supporting services should be assisted and developed. Epidemiological and field studies should be promoted. And techniques applicable in public health control and eradication programmes should be developed.

Tuberculosis

WHO's main concern is with the control of tuberculosis in populations. A suitable research project from this point of view is a trial of BCG vaccine in a population containing a large percentage of persons with a low degree of tuberculin sensitivity. Another is a comparison in a country where BCG vaccine is given orally between the effects of the vaccine as given by this method and as given intradermally. The Committee thought that the inclusion of a non vaccinated group in the latter project is not justified.

Malaria

Although efficient drugs are available for individual use under good conditions, drugs are needed that will be effective when given to large groups under other conditions and for shorter times. Another aspect of anti-malarials in which research is needed is drug resistance.

The final stages of the eradication of malaria from particular areas now present problems. Research is required into the influence of symptomless carriers and into population movements. Resistance to insecticides and ecological research are topics that need attention. Of the basic studies that on the influence of haemoglobin types in susceptibility to malaria deserves support.

The Advisory Committee was informed of the discovery that *Plasmodium cynomolgi* var *bastianelli* has been transmitted by mosquito bite from lower monkeys to man. This means that malaria must now be considered not merely a possible but an actual zoonosis with implications that are potentially great for research as well as for control.

Immunology

In particular projects WHO promotes a considerable amount of research into the preparation, use and effectiveness of vaccines. However, attention also has to be given to the broader aspects of immunology. Techniques and methodology need to be standardized to avoid confusing differences of practice arising with the different vaccines. Methods for evaluating different categories of vaccine and adjuvants and the identification and characterization of active antigenic fractions from different organisms require further investigation. The present position in this field resembles that which faced first the League of Nations and then WHO in biological standardization. Starting from particular cases, however, an impressive body of general knowledge with wide theoretical implications has been created. It might be possible to do this with immunology also.

Nutrition

Nutritional factors enter into many branches of medicine and so nutritionists should be attached to any clinical group investigating, say, microcytic hypochromic anaemia or aspects of normal development in children or diseases due to infections or infestations in which undernourishment is thought to play a part. A nutrition research group should keep in close contact with other international agencies—such as the Food and Agriculture Organization—that are particularly concerned with foods and their relative values and availability. One important task would be to investigate alternative sources of food for example substitutes for milk that could be derived from plants. Yet another would be to direct attention to areas worthy of closer study, an example would be the period of special vulnerability at weaning and in the following few years.

Cardiovascular diseases

Research into coronary artery disease, hypertension and atherosclerosis, being widely conducted in many countries, WHO has here an important role in bringing

together suitable groups of workers interested in these conditions who can exchange ideas and provide stimulation towards further research. There should also be meetings of workers in allied fields such as neuro humoral mechanisms the difference of approach might produce new and valuable ideas. These various meetings should preferably consist of small working parties held in institutions where research is in progress.

The epidemiology standardization of techniques and investigation of the cardio myopathies deserve attention. Most cases occur in tropical countries which unaided

could hardly investigate them fully themselves. The creation of a reference centre in the tropics possibly at Kampala in Uganda is a suggestion worth pursuing.

Cancer

Research into neoplastic disease in animals would assist the study of human cancer by providing clues to etiology through the establishment of relationships between the prevalences of different tumours and environmental and genetic factors. Veterinary and human pathology laboratories should exchange specimens.

MILK AND MALNUTRITION*

Malnutrition is the cause of many diseases in human beings but is particularly harmful to young children pregnant women and nursing mothers. It is one of the principal causes of infant mortality retarded growth mental apathy and later in life reduced working capacity. The programme for the distribution of dry skim milk carried out by UNICEF in collaboration with FAO and WHO is an example of joint international action to improve nutrition in less developed countries.

Since its inception in 1946 UNICEF has devoted 22% of its expenditure to obtaining dry skim milk for supplementary feeding programmes at maternal and child health centres and schools. Technical guidance on the use of the milk in these programmes is given by FAO and WHO.

The three Organizations decided to make a careful survey with the help of qualified consultants of the extent to which the distribution of dry skim milk is a satisfactory way of using international and local resources as compared with other measures to improve the diet of mothers and children. The information obtained was also intended to serve as a guide for the future distribution of this product by international agencies. The experts appointed¹ to undertake this mission

visited Brazil Costa Rica the Philippines Indonesia and Libya between 31 October 1958 and 26 February 1959.

Of the factors influencing the general health and nutritional condition of mothers and children in the countries visited the chief are malnutrition gastro intestinal disorders and intestinal parasites. The nutritional condition of pregnant women and nursing mothers as well as infants and other young children leaves much to be desired. Protein deficiency is the most frequent and serious nutritional disorder. Although vital and health statistics in most of the countries visited were incomplete the rates for births (40.50 per 1000 population) general mortality (10.27 per 1000) maternal mortality (17.12 per 1000) infant mortality (80.556 per 1000 live births) and mortality among children in the 1-4 years age group (12.20% and above of all deaths) were high. The principal causes of maternal deaths are haemorrhage toxæmia and sepsis of infant deaths diarrhoea

¹ Based on Unit d N t s Child n s F d (1959) D y
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bronchopneumonia and malnutrition. The available data on diet indicate that higher milk consumption would greatly increase nutritional standards and thus improve health—particularly in the most vulnerable population groups.

In South East Asia milk production is low and milk does not form a part of the normal diet. Nevertheless the milk distributed by UNICEF and other agencies and that imported commercially have created a demand and a consequent increase in the market for locally produced milk. In the Latin American countries visited some progress is being made in the establishment of dairy industries but milk production is still far below the desirable level.

International distribution of dry skim milk

The amount of dry skim milk supplied through various channels in 1958 is shown below.

VOLUNTARY AGENCIES	kilograms
US milk	204 600 000
Canadian milk	2 000 000
GOVERNMENT SALES	44 500 000
UNICEF	
US milk	25 500 000
Canadian milk	4 600 000
UNRWA (United Nations Relief and Works Agency)	
US milk	1 300 000
	<hr/> 28 500 000

Of the total amount of dry skim milk distributed in recent years UNICEF shipped 30 in 1956, 16 in 1957 and 11 in 1958. It has obtained the milk for distribution as follows: at the beginning (1947-1949) it purchased supplies in the USA and Canada at the market price; from 1950 to 1954 it obtained the milk from the USA at a nominal price and from then on the US Government made supplies available free of charge at the US port of exit. In 1958 Canada also began to supply free milk for the programme. UNICEF bears the cost of transporting these supplies to the ports of destination and the

governments concerned are responsible for transport inside their respective countries.

Distribution at maternal and child health centres

As a rule the dry skim milk distributed at maternal and child health centres is supplied in containers which can be stored for a considerable period without deterioration. When the supply is limited and priorities have to be established preference is usually given to children in the 1-4 years age group. Priority is accorded on the basis of the general state of health, nutritional condition, economic and social situation and in children rate of growth. The milk is either reconstituted in the centre or distributed in powder form in which case instructions for use are given to the mothers. As a rule the milk is well accepted. Some cases of diarrhoea occurred among people using it for the first time but ceased when smaller amounts were given to begin with. The children's weight charts are the best proof of the value of the milk and comparisons between those receiving and those not receiving it clearly show the advantages of the programme. In addition the distribution of the milk has increased attendance at the centres and has often led both the mothers and the staff of the centres to take a greater interest in nutrition.

Distribution in schools

More children receive milk in schools than at maternal and child health centres. Nevertheless it should be remembered that many schools do not take part in the programmes and that in the less developed countries many school age children do not attend school. In the countries visited the percentages of children of school age receiving milk were approximately as follows: Brazil 10.8, Costa Rica 9.3, Indonesia 6.6, Libya 5.0, Philippines 3.9. Unfortunately supervision of the preparation and consumption of the milk in schools is often inadequate, more enthusiasm by the teachers would help. In some of the countries visited the provision of dry skim milk and school meal has clearly helped to improve the health of the children, reduced absenteeism

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¹ Based on United Nations Children's Fund (1959) *Dry Skim Milk*, New York.
WHO appointed Dr G. H. L. Lönnerdal, Director of the Child Clinic, C. T. H. P. L. Lönnerdal, Sweden, and Prof. A. Wallgren, Emeritus Professor of Pediatrics, Royal Carlin Medical School, Stockholm, Sweden. FAO appointed Dr A. Vergara, of the FAO Nutrition Division.

1-4 years age group. Then come pre school and school age children. It should be remembered too that nutritional requirements at the age of puberty are also great. Furthermore within each group the actual state of nutrition and the economic and social conditions of the family should be taken into account. Vitamins A and D should always be given with skim milk to infants and to other beneficiaries in need of these vitamins.

With regard to the "ration" WHO and FAO recommend 40 grams a day in all cases but the local medical authorities should be left free to change the quantity in exceptional circumstances with WHO's and UNICEF's agreement. The daily issue may sometimes be reduced to 25 grams—e.g. for school children who receive other protein rich foods in school meals.

Unlike schoolchildren very few mothers and infants receive the milk at present. If the nutritional needs of mothers, infants and other young children are to be met it will be necessary to expand maternal and child health activities by opening new centres and training fresh personnel for them. Milk could also be distributed to pre school children through kindergartens and other child care institutions but if so their staff would have to be trained to give it. On the whole distribution in the countries visited seems to be well organized. A big obstacle to further expansion in some countries is the cost of internal transport and distribution.

If the programme is to function satisfactorily teachers in the schools and auxiliary personnel at the maternal and child health centres must be trained in the basic facts about nutrition and their practical application so that they can in turn teach the children and mothers. There must also be adequate general administrative supervision. One country has achieved this by appointing 12 full time supervisors each with his own district under the direction of a programme manager.

In countries that have not been milk drinking in the past the best plan in the

absence of any alternative protein rich food is to continue the distribution of dry skim milk and if it is not possible to develop the milk industry in a short time to encourage production of other proteins from local resources.

The economic factor must also be taken into account. The cost of internal distribution may be estimated on the average at \$0.05 per pound and this is high enough to make it impossible for some governments to accept increased quantities of milk. It is difficult to calculate the cost to governments of taking over the whole dry skim milk distribution programme but it may be said that given the existing economic situation in most beneficiary countries they would find great difficulty in assuming this responsibility.

As far as UNICEF is concerned the cost of transport by sea has an important bearing on the possibility of extending the programme. This item amounted to 2.78 cents per pound in 1958 and it has since risen to 3.10 cents. In 1958 the total cost of transporting dry skim milk by sea was just over \$7,000,000.

In considering the future of the international distribution of dry skim milk it must be remembered that so far the whole operation has been made possible by the existence of surplus supplies in the United States and Canada. Apart from the fact that these circumstances may change no country's protein needs should ever—as a long term policy—depend upon chance surpluses from other countries. In the first place these surpluses can never fully meet the needs of the people in the under-developed countries and secondly undue reliance on them might prejudice the natural development of these countries' own resources. Consequently the distribution of dry skim milk must be considered as a temporary expedient only adopted to meet an urgent need. This being so the international agencies must provide countries with the necessary assistance and advice to enable them to develop their own resources and thus cover their nutritional requirements without outside aid.

and led to a rapid increase in the number of children attending school

Nutritional, social, administrative and economic aspects

One of the major advances in nutritional science over the past few years has been the recognition of the frequency of protein malnutrition in infants and young children and of the consequent need to give them more protein rich foods. Each country should therefore prepare a programme to meet its people's nutritional requirements either from its own resources or through international trade. As however many countries are not in a position to do this in the immediate future it is urgently necessary—as a transitional measure—for special arrangements to be made to provide them with protein rich foods.

These foods can at present be obtained only from the surplus stocks of certain countries producing more than they consume or sell abroad at the market price. The principal surplus foods available are dry skim milk and wheat, the former being unquestionably the more valuable for making good a protein deficiency. The main advantages of dry skim milk are as follows: it contains a high percentage of good quality protein and other important nutrients; it is easy to handle, transport and store; it is inexpensive; and it is well accepted.

When fat is removed from milk in the process of skimming, vitamin A is also removed. Since in many under developed countries the intake of vitamin A is low and since young children there often show signs of rickets (vitamin D deficiency) it is important to add vitamins A and D to the diet of children under 4 years of age. UNICEF has sent fish liver oil capsules containing vitamins A and D to some countries for distribution to persons receiving skim milk. However, since the distribution of these capsules entails additional work, the ideal method would be to supply dry skim milk enriched with the necessary vitamins to countries where children are in evident need of them. Field trials on the practical advan-

tages of enriching dry skim milk with vitamins A and D are currently under study.

There is a danger of contamination when the milk is being reconstituted to avoid this the FAO/WHO Joint Expert Committee on Milk Hygiene has made the following recommendations:

Water used for reconstitution must be bacteriologically safe and free as far as possible from mineral salts. If it is not bacteriologically satisfactory it should be brought to the boil and subsequently cooled to 50°C before use. Mixing of a known weight of the milk powder with the correct volume of warm water should be conducted in scrupulously clean vessels previously steamed or sanitized with an appropriate disinfectant solution and rinsed with clean water. Utensils and stirring apparatus used to assist in the mixing as well as containers in which the reconstituted milk is to be dispensed to customers (e.g. in school feeding schemes) must also be scrupulously clean. The mixing itself should be done by an experienced worker or under expert supervision. Any staff dealing with reconstitution or subsequent distribution of the liquid product should have a clean bill of health.

Reconstituted milk should be consumed where it is prepared. The advantages of distributing milk in powder form at the maternal and child health centres are that it can reach more people, the cost is less and the risk of contamination in the centres is reduced. On the other hand there is the obvious danger of the milk not reaching those for whom it is intended and also some risk of contamination during preparation in the home. These disadvantages can however be reduced by adequate instruction of mothers and by visits of maternal and child health personnel to the homes.

As surplus supplies of dry skim milk are limited, priorities must be established according to needs. Those most in need of supplementary proteins include pregnant women and nursing mothers, infants from the age of 6 months (or from the time of weaning if this takes place earlier) and children in the

tion and an improvement in living standards on the part of the population which is well nigh universal there is a dynamic development an eagerness for knowledge and self improvement which manifests itself in an open minded receptiveness of new ideas and practices and which taken at the flood can lead to tremendous advances for Africa

Rapid economic development is now almost the general rule throughout the region and any progress in the field of public health should form an integral part of social and economic development as a whole Other wise efficient campaigns against disease might well result in population increases outrunning productivity in which case the evil of disease might be replaced by the evils of malnutrition and food shortage

The most important obstacles to progress in the central part of the continent of Africa were in the past difficulties of access to and the great distances from the coastlines the shortage and inadequacy of transport and communications the lack of fertility of soil in many areas adverse climatic conditions scattered populations and above all the high incidence of tropical diseases which also account mainly for the low density of its population

From the public health point of view the impact of climate is twofold first the limitations imposed by the climatic factors themselves on human activities health and comfort and second the extent to which climatic factors more specifically rainfall and temperature influence the epidemiology geographical distribution and severity of diseases in man and animals

I should like to take this opportunity to pay tribute to all those scientists who by their tireless efforts to improve living conditions have made the development of these tropical areas possible Among these efforts it is important to remember all the work done to counteract the effects of adverse climatic conditions to improve housing and control the growth of cities to correct malnutrition and enable populations to partake of adequate and well balanced diets a condition of which is the storage of food in circumstances which preserve its quality and purity

Nor should we overlook the improvements wrought in environmental sanitation or the achievements of agriculture and civil engineering to promote land drainage and irrigation to check soil erosion and to create systems of communication And pre-eminent among these is the fight against diseases particularly communicable diseases whose control or elimination is a pre-condition of all other forms of improvement

In trying to give an account of present health conditions and the diseases present in Africa I have to limit myself to a summary since time does not allow me to enter into details Public health problems in Africa do not differ very greatly from those found in other tropical areas except for certain peculiar types of disease such as sleeping sickness which is only to be encountered in this continent

From the public health point of view the African Region is still largely in the stage where eradication of major communicable diseases must be the main priority of any well balanced public health programme Strengthening of public health services everywhere is of course the main objective and campaigns against specific diseases are organized in such a way that they contribute to this over all objective to the largest possible extent

In spite of the fact that the conditions under which control campaigns against disease have to be carried out in Africa are more difficult than elsewhere very important progress has been made there in the field of public health particularly during the last ten years due especially to the possibility of using modern methods of immunization and drugs which did not exist in the past

Yellow fever has practically ceased to be a menace and only very few cases are now days encountered in certain areas whereas in the past it was one of the greatest dangers to health in the region Mass inoculation campaigns either against yellow fever alone or combined with vaccination against small pox and mosquito control in urban areas have reduced the incidence to a rarity

Smallpox is still present and outbreaks still occur especially in West Africa How

HEALTH IN AFRICA*

I consider it a great advantage to be able to speak to you today about health in Africa and in particular in the Region South of the Sahara where I have spent a great part of my working life. It has been my privilege to witness a vast and rapid improvement in the health conditions of this region especially during the last 20 years or so. All those who live in tropical Africa today and who have known conditions in the past are able to appreciate the extent of the progress made in the field of health during this period. Diseases which at one time were practically insuperable obstacles to the development of that part of the world do of course still exist—such as sleeping sickness, malaria, yellow fever, smallpox, yaws and others—but their importance as public health problems has dwindled in very extensive areas while in others they have been completely eradicated.

I know that much remains to be accomplished but if I lay stress on what already has been achieved it is because the special local conditions of tropical Africa are most favourable for diseases to flourish and thus create public health problems which are generally speaking much more acute than those of other parts of the world. To illustrate the point suffice it to say that sleeping sickness as it is found in Africa occurs nowhere else; that malaria there has a very complex epidemiology and is transmitted by the most efficient and dangerous vector found anywhere; that jungle yellow fever also has a most complex epidemiology in Africa; to say nothing of the problems raised by other diseases like onchocerciasis for example.

Pliny referring to what was commonly said in ancient Greece wrote *Ex Africa semper aliquid novi* which I freely translate as 'Always expect something new from

Africa.' Time has not dimmed the truth of this verity.

Africa is the land of contrasts. Climatically it ranges from eternal snow to burning desert heat; two deserts, one in the Northern and the other in the Southern Hemisphere, create the limits of the true tropical zone. Economically there are still tribes which subsist on hunting and close by modern life hums in skyscraper cities and atomic reactors already produce energy. Above all it should be remembered that Africa South of the Sahara is an immense territory. In size it is about equal to the United States, India and China combined. In this vast area of some nine million square miles there live only 145 million inhabitants, appreciably less than in the United States alone. The distribution of this population is most varied and in the main follows the variations in soil fertility and the distribution of disease. Apart from the centres of urban concentration in most areas it is thinly scattered through country rugged in the extreme and with poor communications, especially in desert and semi-desert areas. Although a number of roads and railways run inland from seaports around most parts of Africa there is as yet no completely integrated network of road or rail transport. Air transport which has come as a great boon to Africa has developed mainly between North and South while East-West connexions are still scarce. This is a modern illustration of the fundamental division between East and West Africa which has existed from time immemorial and which touches also the epidemiology and the distribution of diseases. Add to this the extraordinary variety in ethnic groupings throughout the region and a picture emerges of a continent so complex that at first sight it appears to defy generalizations of any kind.

However, on closer examination there are certain characteristics which are common to the region as a whole. For one thing there is an urge toward cultural development, educa-

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children. Generally speaking urban and suburban areas in Africa are mostly free from malaria as well as some rural areas and it is of course in the latter that the malaria problem is present in its most acute form. In many cases it has been proved that residual spraying with insecticides alone did not suffice completely to interrupt transmission. However considerable progress has been made in the study of the technical difficulties encountered in the effort to break the transmission in the areas of Africa where those special circumstances occur. As against this in other areas antimalaria campaigns have produced very encouraging results and special mention should be made of those obtained in efforts to interrupt transmission in the equatorial forest areas (Liberia and Cameroons for instance).

Summing up the situation it is possible to say that the results already obtained give rise to the hope that it will very soon be possible to establish the exact methods or combination of methods which will permit malaria eradication in any particular area of the African Region.

On the other hand in certain zones such as the South Cameroons in some parts of the Union of South Africa Swaziland in the Federation of Rhodesia and Nyasaland and Mauritius the surveillance stage of malaria eradication campaigns has already been reached in yet other areas large scale eradication campaigns are under way as for instance in certain parts of the Federation of Rhodesia and Nyasaland the Union of South Africa Mozambique Bechuanaland and Zanzibar. According to local epidemiological conditions eradication campaigns are based on the use of insecticides complemented by antimalarial drugs distributed in mass prophylactic campaigns to complete the action of the insecticides where the latter cannot by themselves achieve complete interruption of transmission. Additionally drugs are used in certain areas to attempt to shorten the duration of malaria eradication campaigns.

Technically speaking the difficulties encountered are related especially to the peculiar behaviour of anopheline vectors or

the development of resistance by *Anopheles gambiae* to insecticides of the dieltrin BHC chlordan group. However no case of resistance against DDT on the part of any anopheline species has as yet been recorded from any part of the African Region. The choice of method or combination of methods used in malaria eradication campaigns is in the circumstances based upon the results of thorough pre-eradication epidemiological surveys especially made to study the behaviour of the anopheline vector and its degree of sensitivity to the insecticides to be utilized.

There are indeed various sectors in the far flung battle line against disease in Africa where the enemy is in full retreat. A massive campaign against yaws which has now been under way for some years has already reached 17 million people examined of whom more than eight million have received the required treatment. This has brought the eradication of yaws within sight among others in Liberia Ghana and Nigeria—where it no longer constitutes an important public health problem. And in this connection I should like to tell you of a most encouraging development which has taken place in Nigeria. As the mass campaign against yaws in that country reached the integration stage a spontaneous movement among the population of certain regions resulted in the raising of voluntary contributions to develop and maintain rural health centres to deal not only with the remnant of the yaws problem but also to watch over the general well being of the people. Here is a well nigh perfect instance of one of the fundamental principles of WHO as defined in its Constitution in process of application. I quote "Informed opinion and active co-operation on the part of the public are of the utmost importance in the improvement of the health of the people."

To sum up the progress already made indicates clearly that yaws is one of the diseases which will be eradicated from Africa in the near future.

The fight against other treponematoses such as endemic syphilis has also met with encouraging results for instance in Bechuanaland.

ever as a result of mass vaccination campaigns it no longer creates havoc among entire populations while in many areas it has been completely eradicated

Trypanosomiasis despite all efforts made to control it and the good results obtained in vast areas remains one of the most important health problems of Africa. This is particularly true of animal trypanosomiasis. By attacking cattle this disease deprives African populations of meat and milk and it has been without doubt one of the greatest obstacles to economic development in many parts of the continent. But it is important as a human disease also and demands a high priority of consideration. There are several instances in the history of Africa of the devastating effect of human trypanosomiasis which has on occasion depopulated fertile areas as a result of the losses due to the disease or of massive migration to escape death. One instance illustrating the damage which can be caused by this disease occurred in the year 1900 near the shores of Lake Victoria when a population of 300 000 was reduced by two third within a few months. It is known that climate is an important factor in its distribution and there are two distinct types of the disease to be encountered separately in East and West Africa.

However the human type of trypanosomiasis has been largely brought under control in most inhabited areas. Due to mass prophylactic campaigns and the fight against glossinae its incidence has become negligible over vast stretches of the continent. According to statistical data published by the Permanent Inter African Bureau for Tsetse and Trypanosomiasis the incidence of trypanosomiasis due to *Trypanosoma gambiense* dropped from 1948 to 1956 as follows

	Total reported population	No. of inhabitants
1948	77 339 478	6 90
1956	81 543 974	2 09

Bilharziasis also constitutes an important health problem and is one of the most widespread diseases in Africa. Attempts are being made in many places to reduce its ill effects and intensive research is carried out

on a large scale. Surveys are continually being made but as yet it is not possible to point to satisfactory results in vast areas.

Onchocerciasis is a disease of considerable public health importance and is estimated to affect some 20 million people particularly in West Africa. Intensive research is carried out especially in areas where the epidemiology of the disease makes its control particularly difficult. However the simulum vector has already been completely eradicated from areas measuring many thousands of square miles.

Tuberculosis is a very important problem for the entire region. But a considerable expansion has taken place recently in anti tuberculosis work and surveys designed to collect the epidemiological data indispensable for the organization of control campaigns have been carried out in very large areas of the region. Indeed it can be said that almost all countries and territories in the region are now subject to survey by government teams or by WHO teams. Since similar methods are being used in these surveys a very interesting vista has opened up for comparing the data obtained. In addition it is worth mentioning that there are several mass chemoprophylaxis campaigns already under way in Africa.

In the field of leprosy the picture is very encouraging. In the antileprosy campaigns now under way more than one million of the estimated total of 2 300 000 leprosy cases in the African Region are now under treatment with sulfones and it is expected that nearly all will soon be reached. According to experts in this field who met at Brazzaville early this year the percentage of arrested cases is high. The cost of these campaigns varies between \$2 and \$8 per patient per annum. At the present rate of progress it is probably not too much to hope that the present generation in Africa will be the last to undergo this terrible affliction.

Malaria continues to be one of the most important health problems where it is estimated that a population of 116 million is at risk. Owing to a certain degree of immunity acquired in early childhood among this population malaria mortality mainly affects

have in the subject At this point the question may arise "What exactly is WHO trying to do?"

WHO is trying to help governments to help themselves in their efforts to improve health conditions in the African Region. Sometimes WHO is the only international agency which affords assistance and on other occasions it does so in co-operation with other international organizations. An indication of the extent to which this kind of assistance is appreciated and sought after by governments is the fact that the number of projects in the Programme and Budget Estimates submitted to the WHO Regional Committee for Africa has risen from 36 in 1954 to 292 in 1959.

In planning its activities the WHO Regional Office for Africa closely adheres to the principle that since progress in the field of public health has created the opportunity for social and economic advance such advance must follow in order not to create an unbalance in the social and economic structure.

The assistance given to countries and territories of the region consists largely of practical help in the organizing, developing and co-ordinating of surveys and campaigns against communicable diseases as well as work in the field of nutrition. Increasing stress has been laid on the creation and development of an extensive network of national health services capable of absorbing and administering the special services launched to deal with specific problems. Also increasing importance is given to the organizing of basic public health services in conformity with the policy laid down by the World Health Organization.

Furthermore the creation and development of rural health centres and dispensaries operating under their control when added to

the already existing network of health services greatly enhance a country's capacity to improve the health of its people as well as serve as training grounds for medical personnel particularly auxiliary personnel. These rural health centres are extremely useful in the consolidation, integration and surveillance phases of campaigns against specific diseases.

Such developments of course call for greatly increased staff and in its programme for the African Region high priority has been given by WHO to the training and instruction of personnel as the best means of reinforcing and developing existing health services. Also ready and wholehearted co-operation on the part of the people is essential if health services are to function effectively and for this reason considerable attention is paid to the subject of Health Education of the Public while at the same time a special effort is made to obtain the support of well informed public opinion.

Africa is indeed developing rapidly. I have tried to indicate that the state of public health in Africa has exercised a profound influence on the state of development in other spheres. While the rate of progress is so rapid in most of these particularly in economic development, production of electric power and communications, one can be confident that standards of health and living will continue to improve at the same pace. It is precisely the improvement in communications and transport facilities which makes it possible to spread modern medicine and modern methods of public health administration into areas hitherto difficult to reach. And considering the great urge toward self-improvement on the part of the people of Africa, even more rapid development can be expected to take place in the future.

Many other diseases could if time allowed also be mentioned which are of public health importance in Africa such as among others virus diseases helminthiases and diseases due to protozoa not already referred to. However I believe that the summary thus far presented gives at least an indication of the present situation regarding the most important and widespread diseases in the African Region.

The fight against tropical diseases has during the last ten years been characterized by the search for methods to apply the most recent scientific discoveries on a mass basis such as those in the field of immunization of chemoprophylaxis and the use of insecticides against diseases which in the past rendered vast areas of tropical countries uninhabitable. But this application of modern methods on a mass scale requires a complete knowledge of the epidemiology of the diseases concerned as well as a faultless system of logistics designed to achieve the utmost possible effect within the limitations imposed by the time factor as well as the availability of funds.

Any resume of present public health problems in Africa would be incomplete without a reference to the developments which have taken place in what can be called the basic public health services as well as nutrition. In this latter case much remains to be done but important developments have already taken place especially as a result of the interest of governments in the training of personnel to work in this field.

Maternal and child health as well as nursing services have also been considerably developed in recent years and here again training of personnel has proved the greatest need and has been strongly emphasized.

In environmental sanitation important developments have taken place such as the provision in rural areas of water supplies and of latrines which in recent years have been constructed by hundreds of thousands in some places. While this is so and while it is also true that many water borne diseases have disappeared from many cities and some rural areas I can only say that much remains to be done in these fields. Although great

efforts have been made by the public health authorities concerned it must be recognized that there is still a long way to go before it can be claimed that health conditions all over Africa can compare favourably with those areas where standards are high and where communicable diseases generally have ceased to be important public health problems. And furthermore the task is made at once more difficult and more vitally important by the tremendous economic development which is now taking place in most parts of this vast continent. Public health authorities in Africa must be ever on the alert lest economic expansion produce fresh health hazards in fact they have to insist that health considerations are adequately recognized in the earliest planning stages of all economic developments.

During the technical discussions held by the WHO Regional Committee at its meeting at Nairobi, Kenya last September on the subject of Medical aspects of urbanization in Africa South of the Sahara¹ it clearly emerged that public health authorities all over Africa are alive to the fact that among all forms of economic expansion it is precisely urban development which contains the greatest potential health risks.

Nor should the social aspects be overlooked. It should be recognized that the rapid formation of large aggregations of urban and industrial populations creates problems over and above those of housing sanitation and the provision of health services particularly when such populations undergo a sudden transformation from tribal to urban and industrial patterns of society. The hope was expressed that the considerable body of knowledge contained in the present state of the medical and social sciences could be adequately brought to bear to guide this development.

All that which has already been achieved in Africa has been due to the tremendous efforts made by governments and their health services either alone or in co-operation with international organizations and is an indication and augury of the great interest they

available to WHO personnel and to research workers engaged in mosquito control work. Blood specimens come from all over the world to the Institute and are there examined by serologists who use standardized techniques and highly specific sera in order to determine their origin. From 1955 to 1959 more than 56 000 tests were carried out on 51 species of anophelids from some 30 countries. This undertaking unprecedented in its size and variety has already given some very interesting results—results that have led at times to a revision of accepted ideas and thrown fresh light on the behaviour of vector mosquitoes.

In organizing this service WHO's main purposes were to stimulate interest in the study of the biology of anopheline species and their vectorial importance by providing research workers with facilities for the identification of the blood ingested to eliminate experimental error by the use of a standardized dependable serological technique and a wide choice of highly sensitive sera and to improve thereby the planning of malaria eradication in the areas where least was known about the habits of malaria vectors.

In a paper in a recent issue of the WHO Bulletin the Division of Malaria Eradication, WHO and the Lister Institute of Preventive Medicine review the results obtained by this service and discuss its future prospects.

Principle and technique of the test ²

The field worker prepares the specimen for despatch by identifying the mosquito, detaching the abdomen of the female gorged with blood, squeezing the abdominal contents on to filter paper (one piece of filter paper will take several specimens) and sending the filter paper to the Lister Institute in special boxes taking all due precautions to prevent its being spoiled. At the Institute each blood spot on the filter paper is cut out and placed in a small test tube to which physiological saline is added to extract the blood proteins.

The extract is tested with a specific serum—antihuman, antirabbit, antihorse, etc.—prepared from rabbits and the formation of a precipitate at the junction of the two liquids indicates a specific antigen-antibody effect. The tests vary according to whether the research worker simply wants to know whether the blood is of human or animal origin or whether on the other hand he wants to know what species of animal has been bitten. If the latter he carries out more elaborate tests—serum absorption and inhibition of agglutination tests for example—but these are rarely required for the study of malaria vectors which is limited usually to the categories of man, cattle, horse and ass, sheep, goat and pig.

Results of test and biology of anophelines

The precipitin tests carried out on a large scale between 1920 and 1950 led to a revision of certain ideas based on less systematic and less subtle methods. Once more it became clear that the definite or absolute classifications proposed by biologists did not correspond to reality: the classification of mosquitoes for example as "anthropophilic" or "zoophilic" implying an exclusive preference for man or animals was far too rigid and summary. The term "zoophilic" too gave no information on the animal species preferred and the difference between the two groups was one of degree rather than of nature, there being actually a whole range of preferences depending in particular on the climatic and other conditions in which the mosquitoes lived. Thus the long-established belief that *A. gambiae* was completely anthropophilic had to be discarded. In 1947 this species was reported to be abundant in the uninhabited Semliki forest and in 1948 it was shown experimentally that the *A. gambiae* complex fed almost indiscriminately on man, cattle, goat and pig. In the Lake Chad area it was observed to bite domestic animals, particularly the horse as well as man. It thus appeared that *A. gambiae* could subsist in various parts of Africa independently of the presence of man. Recent results have confirmed these views. In the Western

² B. N. W. H. H. A. Org. 1960 22 685
The technique of the test is described by B. N. W. H. A. Org. 1960 22 685 47

FEEDING PREFERENCES OF MOSQUITOS

Malaria is transmitted only if a mosquito bites two individuals successively at a suitable interval the first being infected and at a stage where the parasite is infectious to the mosquito. At the first bite the mosquito ingests the parasite and at the second transmits it. For infection to take place too sufficient time must elapse for the parasite to pass through the various stages of the sexual phase and reach the mosquito's salivary glands when it becomes infectious to man. It has long been known that mosquitos feed not only upon man but also upon various animals, particularly mammals and occasionally reptiles and birds. It is also known that they do not feed exclusively on one host but can feed on several depending on circumstances or on the presence or numbers of possible hosts. It is clear however that the importance of anopheles as a vector depends largely on its preference for human blood and on its opportunities for contact with man. In order to elucidate certain biological problems that still obscure our knowledge of the epidemiology of malaria it is thus of prime importance to determine the feeding preferences of anopheline species capable of transmitting malaria. Some regional or local failures in malaria eradication campaigns are undoubtedly due to relative ignorance of the insect vector's habits, behaviour, movements during the gonotrophic cycle and host preferences and to variations in these factors due to climate, geographical situation, fauna, agricultural development, population etc.

These are questions that arise all over the world for hundreds of research workers, malaria institutes and WHO team members. Studies of the feeding habits of mosquitos using traps or laboratory methods with different hosts in conditions that are necessarily not natural give partial results but are difficult to standardize. In recent years therefore much interest has been shown in a method that is not new but has been

steadily improved, the *precipitin test* which enables the source of the blood ingested by mosquitos to be determined serologically.

The idea of examining the stomach contents of vector arthropods to find out what they feed on dates from the beginning of the present century. Koch examined microscopically the stomach contents of tsetse flies he suspected of feeding on crocodiles. Needless to say microscopic examination that will distinguish the blood of reptiles or birds cannot distinguish between the blood of different kinds of mammals. The precipitin test which was derived from Nuttall's work on the antigenic relationships of animal sera and their correlation with zoological classification was improved at the beginning of the century and used in the twenties and after to study the food preferences of mosquitos. Boyd in particular carried out over 48 000 tests from 1930 to 1944 and to him we owe most of the information available ten years ago on the degree of preference of various anopheline species for human or animal hosts.

Collaboration of WHO and the Lister Institute of Preventive Medicine

In 1955 when the world wide malaria eradication campaign was launched WHO felt that the precipitin test should be used on a large scale to identify the origin of the last blood meals of anophelines and so permit assessment of their degree of contact with man. It considered that there was a good case for making precipitin testing freely available to interested field and research workers especially as it was becoming obvious that the disappointing results of some spraying campaigns were due to ignorance of the behaviour of the vectors.

In 1955 by arrangement with WHO a centralized service was set up at the Lister Institute of Preventive Medicine, Elstree, England to determine the origin of blood ingested by anophelines. This service is

A. funestus the difference is still more marked 97 as against 14/. These figures are clearly indicative of "avoidance behaviour" the mosquitos quit the habitations treated before they have absorbed a lethal dose of insecticide and have less opportunities for biting man outside. Comparison between habitations treated with dieldrin and with DDT shows that DDT is more irritating and induces avoidance behaviour to a more marked extent than dieldrin. Are these changes in behaviour temporary or does spraying over a period of years cause a lasting change in the habits of the species? Observations in Greece on *A. sacharovi* seem to favour the second alternative but more intensive research is needed.

Transmission of malaria depends in the

last analysis on the susceptibility of the mosquito to the parasite and on the opportunities it has for biting a man at a favourable moment becoming infected and biting another at the crucial time when it can infect him. In 1910 Ross estimated the percentage of infected mosquitos belonging to "good vector" species and having the opportunity to bite man a second time at 4/. Although its chances of finding its essential hosts at the critical stages of its development are small the plasmodium has maintained itself in the world for thousands of years having as Sherrington remarks overcome with ingenuity great obstacles to perpetuate itself⁴.

Sherrington, C. (1955) *Man on his nature* Harmondsworth, Penguin Books p. 78.

Reports of Expert Groups

Expert Committee on Tuberculosis*

Antituberculosis work has been facilitated by a number of non specific factors and in particular by the raising of living standards but specific control methods are still valuable and have in fact become increasingly effective.

In many countries emphasis was placed in the past on the care of individual tuberculous patients particularly those in hospital. Today control measures can be extended to whole communities.

The control programme proposed by WHO lays particular stress on the public health approach to this problem. Owing to the progress made in the last ten years and in particular to the introduction of effective antituberculosis drugs it is now possible to

extend control to countries that were not previously able to adopt effective measures against the disease.

A WHO Expert Committee on Tuberculosis¹ met from 28 September to 3 October 1959 in Geneva to review recent developments in the field of tuberculosis in general as well as the WHO control programme. Its report has just been published.

Epidemiological aspects

Data on tuberculosis mortality are still considered useful for international comparison provided the countries from which they are drawn have adequate death registra-

WHO Expert Committee on Tuberculosis (1960) *Report* (Hid. H. A. Org. An. R. Ser. No. 15) Geneva, 1960. Price 1.9 \$0.30 Sw. f. 1.- Also published French and Spanish.

Members of the Committee: Dr E. A. Aleu, France (Chairman); Dr P. V. Ben Ammi, India (Vice-Chairman); Dr J. M. C. Gregor, United Kingdom; Dr J. E. Perkins, USA (Reporter); Professor N. A. Schmele, USSR; Dr G. J. Wherret, Canada; S. H. Fry, Wundert, Australia; Secretaries: Dr J. H. Im, WHO (Secretary); Dr M. De Marchi, WHO; Dr L. S. la WHO.

Sokoto Project in Northern Nigeria 95% of 468 *A. gambiae* collected in houses were positive for human blood 79% of 195 collected in stables were positive for horse blood and in mixed habitations 72% of 96 were positive for man 24% for horses and cattle and 4% contained mixed blood. In Taveta Pare (Tanganyika) where people share their abodes with cattle 70% of tests were positive for man but in villages of areas rich in cattle the proportion was approximately equal (41% for man 51% for cattle). In open air shelters on the other hand the proportion was 13% for human blood 74% for animal blood.

Generally however the results of the tests and particularly the human blood ratio (the ratio of the number of tests positive for man to the total number of positive tests) were in agreement with what was known of the importance as vectors of the species of anophelids examined. In spite of local or regional differences certain species taken as a whole recorded high (more than 75%) ratios for human blood. These were *A. barbirostris*, *A. gambiae*, *A. funestus*, *A. leucosphyrus*, *A. hancocki*, *A. moucheti*, *A. nili*, *A. sundanicus* and *A. wellcomei*. In the following species the ratio was only 5-10%: *A. aconitus*, *A. annularis*, *A. cinereus*, *A. demeilloni*, *A. fluvialis*, *A. hyrcanus*, *A. sinensis*, *A. implexus*, *A. kochi*, *A. maculatus*, *A. maculipennis*, *A. oswaldi*, *A. pretoriensis*, *A. puncti*, *A. macula rivulorum*, *A. rufipes*, *A. subpictus*, *A. malayensis*, *A. superpictus*, *A. triannulatus*, *A. davisii* and *A. vagus*.

Value and limitations of test

The precipitin test has no absolute value. Its results must be assessed in the light of other data: the presence or absence of the preferred host, the characteristic behaviour of the species, the density of the anopheline population, the season, the climatic conditions, the time and technique of mosquito collection and the conditions and micro-climate of the collection site.

What attracts a mosquito to one host rather than another and what limits are there to this preference? Very little is as yet known about the internal and external factors guiding a mosquito's choice. Accord-

ing to a recent study³ the stimuli are smells exerting their effects with the aid of temperature and air movements. Laarman holds that blood undoubtedly contains attractive odorous substances that most probably play a part. Experiment has shown that *A. atroparvus* clearly distinguishes between man and rabbit. In nature it is probable that the odours emitted by man and animals, the nocturnal rest rhythm, the skin surface exposed and the ease of access to capillaries are all variable factors influencing the mosquito's choice. To these must be added genetic factors and endophilic and exophilic tendencies—themselves relative for it has recently been shown that young females prefer to feed outside and older females in side houses. All these variations in behaviour must be taken into account along with the serological tests to obtain a proper picture of the characteristic habits of an anopheline species. The two types of research—serological and experimental study of natural behaviour—are complementary. On the one hand the number of precipitin tests must be increased; on the other experimental methods of trapping mosquitos to which several hosts are available must be developed. Studies from this dual standpoint could be started straightaway on *A. sergenti* for example in the Jordan valley—a mosquito whose feeding preferences are imperfectly known and which is responsible for a low transmission rate in Israel, Jordan and Syria and on *A. gambiae* in Mauritius—here the human blood ratio is low and the hosts are unknown.

Changes in behaviour

The precipitin test may be of great help in studying possible changes in the behaviour of mosquitos subjected for a prolonged period to insecticides in areas where these have been used for years. An example is found in the Bobo Dioulasso area of the pilot project in the Republic of Upper Volta. Here the differences observed in 1958 were striking: the human blood ratio for *A. gambiae* for villages not treated with DDT was 93% and for treated villages 76%. For

La ma J J (1955) Th h r k g b h a l f h
m l f m q U t e h t

techniques for the latter type of examination are however not sufficiently simple for mass application

Preventive measures

Present knowledge and experience show that BCG vaccination confers a considerable degree of protection against tuberculosis that its disadvantages and risks are negligible and that it can be applied as a mass measure without undue difficulty as to cost or personnel. The report therefore recommends that BCG vaccination be given prominence in the antituberculosis programme in most countries. Its exact place in the programme will depend upon the epidemiological situation and the existing facilities for combating tuberculosis in each country. When the prevalence of tuberculosis in a country has fallen to a sufficiently low level BCG vaccination may be confined to certain population groups particularly exposed to the risk of infection.

Chemoprophylaxis is considered as adequate only in areas where the disease is highly endemic. In such areas isoniazid should be administered to cutaneous reactors to tuberculin who have not been recently vaccinated with BCG and who are associates of infectious cases.

Traditional preventive measures such as the isolation of infectious patients are still valid and should be applied wherever practicable.

Treatment

The great problem in tuberculosis control throughout the world is to ensure that all tuberculous persons are treated.

Resistance to drugs and especially to isoniazid has not proved to be as serious a public health problem as was anticipated although there is a need for international standards for the determination of drug resistance that will permit comparisons to be made from one area to another.

It is recommended that drug treatment be applied to all persons found upon chest X-ray examination to have shadows likely to indicate tuberculosis even when the sputum is negative. This recommendation

however refers only to persons who cannot be subjected to thorough physical examination and it is put forward in the light of recent research indicating that persons showing such shadows are more liable than others to develop active tuberculosis.

In countries where resources are limited and in which tuberculosis is a serious problem it is advisable to concentrate efforts in the first place upon mass home treatment with antituberculosis drugs leaving hospital construction to a later date. However where beds are available for tuberculous patients all measures likely to protect the community should be taken including the hospitalization of patients at least long enough for their thorough clinical examination, their education in regard to the disease and their segregation until they are no longer infectious. In most cases adequate treatment with drugs eliminates the need for surgical intervention though this is not always avoidable.

Case-finding

In countries with well-developed tuberculosis control systems fixed clinics are preferable to mobile teams since they can serve as both diagnostic and treatment centres. They should however have mobile units for group examinations.

Mass X-ray case finding programmes have been found to be useful for the rapid coverage of large adult populations. They should however be followed by more selective operations paying special attention to the examination of groups in which prevalence is known to be high, groups in which there is more than average risk of infection and certain professional and other groups whose members may constitute a special danger to others if they develop infectious tuberculosis.

In these selective programmes re-examination about every three years would seem to be sufficient except in the case of certain "high risk" and "danger" groups.

In countries where tuberculosis is a serious problem and control is in its early stages fixed clinics are a first necessity for the examination in large numbers of persons suspected of being tuberculous and their

tion systems. On the other hand morbidity data are not considered suitable for international comparison although they may be useful for following the trend of tuberculosis in a given country or area.

In many parts of the world especially in those where the tuberculosis problem is greatest no reliable data are available so that prevalence surveys have to be made to obtain the information required for the planning and evaluation of a control programme. For purposes of international comparison perhaps the most reliable data are those indicating the proportion of persons excreting the tubercle bacillus the second best being data on the prevalence of significant shadows in chest X ray films. Data on the proportion of positive reactors to the tuberculin test are also of great importance provided that the existence of non specific positive reactors and of the possibility of previous BCG vaccination is taken into account. The tuberculin test is in any case a valuable pointer to the tuberculosis situation in countries where the prevalence of the disease is low.

Tuberculosis epidemiology varies considerably from one country to another. It would be desirable for all countries to make local epidemiological studies to determine the relative importance of the several ways in which the disease spreads (family contacts, bovine tuberculosis, tuberculosis in other animals etc.).

Methods of examination for pulmonary tuberculosis

The tuberculin test is one of the most valuable tools in the antituberculosis workshop. The Mantoux intracutaneous test is considered the best method for the diagnosis of tuberculosis if correctly applied (using a standard dose of a well standardized tuberculin) and correctly read. The reading should be taken after three days and the result recorded. Results should be reported in millimetres on the basis of the largest transverse diameter rather than merely given as positive or negative so as to permit comparison of results from different areas.

The Committee discussed the problem of non specific reactors and arrived at the following conclusions: a reaction of less than 5 mm indicates in all probability that the person is *not* infected; a reaction of 10 mm or more indicates in all probability that the person is infected; a reaction measuring 5-9 mm indicates that infection is doubtful and if precise determination of infection is essential a careful clinical and laboratory examination should be made of the person concerned.

Research is continuing into tuberculin testing and it is hoped that by the use of more than one antigen or some other procedure it may be possible before long to determine more definitely in every case whether *M. tuberculosis* infection exists or not.

The Committee considered that chest X ray examination by radio photography or radiography is extremely valuable in tuberculosis control and that the amount of radiation from properly constructed and properly operated appliances is negligible compared with the advantages of this procedure. The desirability of tuberculin testing before X ray examinations in order to reduce exposure to radiation depends upon local circumstances (prevalence of tuberculosis infection) and should therefore be determined locally. Nevertheless in countries where the prevalence of tuberculosis among children is low radiological examination in the younger age groups should be confined to children shown to have been naturally infected.

It is of course very important that X ray apparatus should be sturdily made and easy to transport, handle and maintain—and this presents difficulties particularly in economically under developed countries. The Committee expressed the view that standardization of all radio photographic appliances is also very desirable. The report recommends that the reading of films should be done independently by two qualified persons.

Another practical method used in many countries is microscopic examination of the sputum for detection of the tubercle bacillus. This method is relatively reliable but it has the obvious disadvantage of being less sensitive than examination by culture. Present

Epidemiological and Statistical Information

Infant mortality

The figures published for a large number of countries in a recent WHO *Epidemiological and Vital Statistics Report*¹ are indicative of trends in infant mortality which is the most sensitive index of the degree of health and social protection in a community. These figures do not achieve statistical precision owing to the great variations in infant death rates through the world, the use of different nomenclatures for diseases, errors in diagnosis, failure (for whatever reason) to state the true cause of death, incomplete or vague statements, and faulty classification.

Infant mortality, formerly heavy, has decreased to a remarkable degree at least in the more developed countries of western Europe, the USA, and some of the territories of the British Commonwealth. In these areas the raising of the level of health improvement in hygienic conditions, greater use of preventive vaccination, the increase in the number of physicians and health organizations, the discovery of effective medical treatment, and advances in medicine have all helped to reduce infant morbidity and mortality.

The statistics of infant mortality cover the annual number of deaths from 1901 to 1958. Since 1921-1925 there has been a decrease in infant mortality in all countries. Two different trends are noticeable among the countries that had high rates in 1921-1925. In some of them there has been a remarkable decrease although it is far from being the same everywhere. The 1957 infant mortality rate as a percentage of the 1921-1925 rate—at which time a general decrease became apparent throughout the world—shows that the most important relative reduction occurred in Malta and Gozo, Singapore, Hawaii, Czechoslovakia, and the Netherlands. On the other hand, the decrease in

countries like Guatemala, Uruguay, Yugoslavia, El Salvador, Portugal, and British Honduras is much less. The infant mortality rates per 1000 live births are shown in the following table.

Coun ^t	19 1 19 5	19 1 19 5	19 36	19 57	19 7 as % of 19 1 19 5 rate
Netherlands	70	7	19	17	4
Iceland	5	2	17	17	33
Sweden	60	19	17	18	30
New Zealand	43	21	19	0	47
Norway	5	3	21	20	38
Australia	58	23	22	21	36
Switzerland	65	29	6	23	35
England & Wales	76	27	24	23	30
Denmark	8	27	25	23	28
Hawaii	121	22	23	24	0
United States					
of America	74	8	26	6	35
Finland	96	32	6	28	29
Northern Ireland	82	37	29	29	35
Scotland	97	33	9	29	32
Union of S. Africa	73	3	31	29	40
Canada	99	35	3	31	31
Ireland	70	40	36	33	47
Czechoslovakia	154	49	31	33	21
France	94	43	36	34	36
Belgium	106	44	39	36	34
Luxembourg	110	42	37	39	35
Japan	159	48	41	40	25
Singapore	24	63	42	41	18
Malta and Gozo	266	70	43	41	15
Austria	138	51	43	44	32
Italy	127	38	49	50	39
Malaya	176	70	54	54	31
Trinidad and Tobago	133	7	64	57	43
Hungary	187	69	59	63	34
Ceylon	190	75	67	68	36
El Salvador	135	81	70	87	64
Portugal	146	91	88	88	60
Uruguay	106	56	73	90	85
British Honduras	155	91	69	9	59
Guatemala	104	99	89	100	96
Yugoslavia	144	115	98	101	70
China	239	116	109	117	49

Preliminary preliminary estimates and data

contacts and for the treatment of confirmed cases as soon as possible mobile units should be attached to them

Organization of a tuberculosis programme

As tuberculosis constitutes a social problem its control must be an integral part of the community's public health programme. The report recommends that the aim of all tuberculosis control should be eradication of the disease. This means that in countries where the prevalence is high the immediate problem will be that of organizing services capable of reducing the number of cases.

As a rule the disease cannot be considered as having ceased to be a public health problem until the proportion of natural reactors to tuberculin among children under 14 years of age has become less than 1%.

The various stages in starting a tuberculosis control programme in a country should be a planning stage a pilot stage including a national pilot area project detailed prevalence surveys and the establishment of a national epidemiological centre for tuberculosis finally extension of the programme from the national pilot area to the rest of the country.

The role of WHO

The report finally considers WHO's part in the world programme for the control of tuberculosis and the assistance the Organization gives to the various national programmes.

One of the principal problems in nearly all countries is the shortage of suitable personnel. WHO is collaborating in the training of the various categories of staff and in the organization of the necessary courses and services. National pilot area projects are to be used as training centres for most of the

personnel needed for control programmes in the different countries. It is recommended that wherever practicable professional key personnel be trained as close as possible to their home countries and that in order not to waste the time of highly trained professional staff the programme for the training of technicians (BCG, X-ray and laboratory technicians, health educators, home visitors) should be intensified. Arrangements should be made for the continual evaluation of their work to ensure that they are used to the fullest possible extent but without exceeding the functions specifically assigned to them.

The report mentions the need for standardizing both epidemiological terms (applicable also to other communicable diseases) and clinical terms relating specifically to tuberculosis. Examples are such terms as "minimal", "moderately advanced" and "far advanced" to indicate the various stages of the disease. Reference is also made to the necessity for standardizing BCG vaccine and the International Unit of Purified Protein Derivative of Mammalian Tuberculin.

It is recommended that continued efforts be made to standardize techniques for the tuberculin test for the reading of X-ray films for the examination of sputum and for other procedures necessary in tuberculosis control.

In view of the great importance of research in the field of tuberculosis and of the present tendency to decentralization the Committee emphasized the need for an adequately staffed central tuberculosis unit in WHO to co-ordinate research and in particular epidemiological investigations. This unit should also be able to distribute useful information to all persons interested in tuberculosis. It was felt that this could easily be accomplished by sending the information to the various Ministries of Health and national antituberculosis associations which could in turn ensure its wider circulation.

Improvement of rural living conditions in Mexico

No community is opposed to improvement but only to unsatisfactory methods of promoting improvement. This statement of principle is the basis of an article which Dr R. Vega Rivera devoted recently to experiments made in a rural area of Mexico.¹ Health promotion in rural areas encounters many difficulties particularly in the Bajío region of the Mexican uplands which covers 4000 km² and has a population of 380 000 about half of whom live in some 400 rural communities. Most of these communities have never had any contact with health activities and enteric and other diseases connected with bad hygienic conditions are wide spread. To improve conditions a programme in four stages has been adopted: (1) protection and repair of sources of drinking water and other domestic supplies; (2) installation, use and maintenance of latrines; (3) installation of minimum prophylactic services; (4) measures for better domestic hygiene.

The success of such an undertaking depends *inter alia* upon the competence of the personnel entrusted with the programme, their knowledge of economic and social conditions in the regions in which they will be working and their ability to get on with people. One very important factor is their psychological attitude towards the inhabitants of the area where they are working. A continuous effort must be made to keep up the morale of the people, to show them the progress that has been made, explain delays and prevent impatience and indifference if the results are less spectacular than had been expected. Health workers must adapt themselves to the tempo of village life and remember that most of the inhabitants will not be particularly keen to spend the small amount of leisure on

communal activities involving a certain responsibility.

Every programme of this type must proceed by the following stages: initial contact, circulation of information, collection of data, decision to proceed, execution of the programme, evaluation.

It is on the initial contact that the success of the whole undertaking depends. At this stage the villagers' interest must be aroused and the community's confidence and acceptance gained. The community selected should be the one which offers the best facilities for the execution of the work.

The second step should be the wider diffusion of the programme's aims. A first meeting should be held with a small group of community leaders. A clearly defined objective should be laid down so as to avoid unnecessary and involved discussions.

After this first meeting the need for another with more participants can be suggested but this should not be held for one or two weeks so that the original group and their families may have time to discuss the advantages and disadvantages of the action proposed.

Very often the initial contacts will be sufficient. However for a project of any size accurate demographic, socio-economic and health data must be procured together with information on the community's resources.

These data can be obtained from the local leaders and passed on to the competent technical service.

The decision to approve the programme must always be based on free discussion of the proposed action and its cost. When the programme provides for cash repayment, the timing of the repayment to be made is very important: the best system is to arrange for it to be made after the harvest rather than to fix a specific date.

There is no reason why the decision to proceed and the organization of the programme should

In some countries the decline in infant mortality which was very marked after the war can be explained only if we also take into consideration the decrease in births

The year 1958 marks a new record. As in preceding years Sweden leads with a rate of 16 deaths per 1000 live born which is the lowest ever recorded in the world. It is followed by the Netherlands and Iceland (17), New Zealand (19), Australia (20) and Switzerland (22).

Infant mortality rates are usually divided into two groups: deaths that occur in the first four weeks of life (neonatal) and those that occur later up to the end of the first year (post neonatal). It is in the latter category that the greatest overall improvement (between 60% and 70% in many countries) occurs as can be observed in the column opposite.

What are the causes of these infant deaths? Among the countries considered the highest death rate is caused by haemolytic and haemorrhagic diseases of the newborn, neonatal disorders arising from certain diseases of the mother during pregnancy, nutritional maladjustment, ill-defined diseases peculiar to early infancy and immaturity. Most of these causes exist at birth and practically all the deaths due to them occur in the neonatal period. The other two main groups of causes of death are congenital malformations, birth injuries and postnatal asphyxia and atelectasis and influenza pneumonia and bronchitis. The first group is responsible for from a quarter to a half of infant deaths in all countries except Trinidad and Tobago.

Country	Percentage of total deaths as a result of infant mortality in 1958	
	Neonatal	Post-neonatal
Belgium	39	80
Luxembourg	49	76
Czechoslovakia	77	80
Japan	66	81
Hungary	60	71
Uruguay	+6	26
Chile	68	34
New Zealand	48	60
Iceland	57	77
Norway	45	73
Australia	50	79
Sweden	44	89
Switzerland	51	80
Netherlands	56	88
England and Wales	52	84
Scotland	47	83
Northern Ireland	35	87
Denmark	48	86

Venezuela, Ceylon, Japan, Portugal and Yugoslavia and congenital malformations—the component responsible for the highest death rate—account for around 400 per 100 000 live births on the average (ranging between 306 for Canada and 491 for Belgium). The second group is responsible for between 6.9% (Sweden) and 28.8% (Yugoslavia) of infant deaths. Nearly all deaths in this group occur in the post neonatal period.

In Venezuela, Hungary, Portugal and Yugoslavia diarrhoea is an important cause of death, causing between 12.4% (Hungary) and 29.4% (Portugal) of deaths from all causes.

the best methods of training personnel more effectively to deal with health problems in Latin America. Thirty three teachers and public health officers from Argentina, Brazil, Chile, Mexico, Peru, USA and Venezuela were present, as well as PASB officials. The final report adopted by the Conference and a working paper on public health schools have been published in the PASB Boletín.

Periodontal disease

Periodontal disease is the broad term used to describe a group of diseases affecting the supporting structures of the teeth. These structures (collectively known as the periodontium) comprise the bone of the tooth sockets, the cementum on the roots of the teeth, the membrane or ligament which holds the teeth in their sockets and the gingiva or gum tissue surrounding the teeth. The progressive destruction of these tissues leads to loosening of the teeth and if not checked by active treatment to their loss. The infective process lowers the body's general resistance to other diseases and is slow and insidious, pain the usual danger signal being absent (or tolerable) until the later stages, when it is often too late to institute successful therapeutic measures.

Until recent years periodontal disease has not been given the attention it deserves as it has been overshadowed by dental caries which in contradistinction to periodontal disease destroys the hard tissues of the tooth itself. Both diseases are the result of abnormal bacterial activity but while dental caries is initiated by an acid attack on the tooth enamel as a direct result of bacterial fermentation of carbohydrates (especially sucrose), periodontal disease usually starts as an inflammation of the gingiva followed by deposition of calculus around the necks of the teeth. In both cases a bacterial plaque is formed and one of the puzzling features is why this plaque should promote acid formation in the case of caries and act as a framework for the deposition of calculus in periodontal disease.

There are other puzzling features and many gaps in our knowledge of periodontal disease. For example, progressive destruction of the

periodontium can occur occasionally in the absence of calculus formation and when no visible bacterial plaque is present. Adverse systemic states such as occur with nutritional deficiencies, endocrinological imbalances and debilitating diseases are thought to be active in these cases and to lead to nutritional deficiencies within the cells of the supporting tissues, thereby causing cell degeneration and a general breakdown of these tissues. However, recent research indicates that while systemic factors undoubtedly disturb the normal resistance of the periodontium to disease, an invisible bacterial plaque may be the direct cause of its destruction.

Epidemiological surveys of periodontal disease have been made in many countries and, although the results are not always strictly comparable owing to variation in the indices and recording methods used, sufficient evidence both epidemiological and clinical exists to show that in some countries and races periodontal disease is far more prevalent and a greater public health problem than in others. While this is particularly so in Asia and Africa, the incidence of the disease in European countries is such as to cause concern to the dental profession and health authorities. Surveys in these countries indicate that socio-economic status, nutrition and habits of oral hygiene also play a role in the initiation of periodontal disease.

The problem of periodontal disease has been reviewed by a WHO Expert Committee on Dental Health (Periodontal Disease) at a meeting convened in Geneva between 22 and 27 August 1960. When its report is issued it will be reviewed in the Chronicle.

Standardization of microbial sensitivity tests

A WHO Expert Committee on Antibiotics met in Geneva from 11 to 16 July 1960 to discuss the problem of standardizing methods of carrying out microbial sensitivity tests for both survey and clinical purposes. It examined the question of microbial resistance from the theoretical and the practical points of view. On the basis of information collected from laboratories in different parts of the world it reviewed present methodology and made recommendations on

not be simultaneous. In most cases the community leaders automatically assume responsibility for the application of the programme. In larger communities a committee may be set up to take charge of the administration, execution and supervision of the work and possibly to suggest future activities.

Evaluation can be effected either after each stage of the programme or at the end. If there is slowness in passing from one stage to the next, the reason should be sought and the system of work improved accordingly.

The final evaluation should be both quantitative and qualitative. Quantitative evaluation will cover such factors as the number of measures undertaken, the cost, the number of persons benefiting, etc. Even more important in a programme of this type is the qualitative evaluation which will take into account the reactions of the community to the innovations, the use they make of them, and their desire for further progress.

Public health teaching in Latin America

Social development, economic progress and community health form an inseparable triad. Progress in health is hindered in socially and economically unproductive surroundings; economic and social progress is held up when community health is at a low level. None of the three members of the triad can get very far unless accompanied by the others, and they must all be in a reasonable step. This is a fundamental concept which, although it complicates matters, strengthens and gives balance to planning for health.

This briefly summarizes the views of Dr Abraham Horwitz, Director of the Pan American Sanitary Bureau, which acts as the WHO Regional Office for the Americas, views expressed at the conference on public health schools held in Huasca Hidalgo, Mexico, in November 1959.¹ Dr Horwitz, reacting against the excessive technological bias that produces in the mind of the future doctor a distorted idea of his mission and in the last analysis a dehumanization of medicine, advises South American universities

to revive the principles of Hippocratic medicine which seeks to understand man as a whole, a biological entity in thought and in action and a social being.

For 2500 years Hippocrates has personified the pragmatic approach of Aesculapius and the humanist traditions of Hygieia. The followers of Aesculapius believed that the physician's chief task was to treat disease and restore health, remedying the defects caused by the contingencies of birth or of life. To the followers of Hygieia health was a positive attribute to which man can aspire if he rules his life wisely. In accord with these views, Rene Dubos² has said that the most important function of medicine is to discover and teach the natural laws whereby man can achieve *mens sana in corpore sano*.

The relation of the community to health is the same as the relation of man to medicine. Every community is an essentially dynamic organism, the component parts of which are interdependent and exert a mutual influence on each other. Health problems and ways of solving them should therefore be viewed as a whole and in relationship with the other factors influencing community welfare and social progress.

The times in which Latin American countries are living—Dr Horwitz maintains—make it necessary to conceive of health as an essential component of welfare and consequently of economic development. Health activities do not progress as they might be expected to when they are carried out in a society that is relatively static in respect of other fundamental functions. In other words, health work is of limited effect in a static economy. If professional training is viewed in this light, health specialists cannot restrict their knowledge to specific problems and techniques of dealing with them or worse still analyse them out of context. They should instead find out about the community in which they are going to work, the characteristics of the human groups of which it is composed, the extent of the problems hindering its progress and how to work in harmony with other technical experts.

The conference on schools of public health at which Dr Horwitz spoke met to enable a group of teachers of public health to discuss

¹ Dubos R. (1959) *Milking the Machine*. Oxford: Oxford University Press.

International reference centre for respiratory viruses

An International Reference Centre for Respiratory Viruses has been established at the Common Cold Research Unit, Coombe Road, Salisbury, Wilts, England, as part of a system of WHO Reference Laboratories. The work will be coordinated with that of the World Influenza Centre, which was established and assisted by WHO and other laboratories at the National Institute for Medical Research, Mill Hill, London, NW 7. The work will be under the general direction of Drs C. H. Andrewes, D. A. J. Tyrrell and D. Taylor Robinson, members of the staff of the Medical Research Council.

A main object of this and other reference laboratories is to attempt to maintain some order in the classification and naming of the many respiratory viruses now being identified. This can only be done through free interchange of information and strains of virus between workers in different countries.

Many virus laboratories must have isolated agents which they cannot identify. The Salisbury centre cannot undertake to identify any and all of these. It will be prepared to accept for study unidentified respiratory viruses if (a) it has proved impossible to name them with the aid of diagnostic reagents in the best equipped laboratories in the country of origin, or (b) as a matter of

urgency if they seem to be associated with a serious outbreak of respiratory disease.

The centre will of course have to prepare diagnostic sera against new viruses; these will be available for exchange with other reference laboratories but to begin with not elsewhere.

Viruses requiring investigation are likely to include myxoviruses, adenoviruses, enteroviruses associated with respiratory infections, common cold viruses and some others such as reoviruses and respiratory syncytial viruses.

It is expected that more reference laboratories for respiratory and other groups of viruses will be set up shortly and that these will to some extent work on a regional basis.

Child guidance

The WHO Regional Office for Europe has held a number of seminars on mental health in children in 1951 in Scandinavia, in 1956 in Switzerland and in 1957 and 1959. Another—a seminar on child guidance—was held in Brussels between 9 August and 9 September 1960 and was attended by participants from a number of European countries. The subject of the seminar was the utility of child guidance centres and among the topics discussed were the kinds of patients and families making use of the centres, the needs of communities, the aims of and services offered by the centres, the results of their work, research methodology and the training of personnel.

People and Places

Insecticide susceptibility

Dr William M. Hoskins, Professor of Entomology at the University of California, USA, and chemist to the California Agricultural Experiment Station, was appointed WHO consultant in environmental sanitation for the period 14 June to 14 August 1960.

Dr Hoskins reviewed data obtained in the field with WHO test methods for determining the susceptibility of adult mosquitos and larvae to insecticides, gave advice on their analysis and examined the question of their extension to

malaria eradication projects. He visited research centres in the Netherlands, England and Denmark to discuss recent advances in research on insecticide resistance and insect control and to suggest means of co-ordinating more closely research efforts with particular reference to WHO interests.

Hospital administration in Viet Nam

Dr R. F. Bridgman has been appointed WHO consultant to advise the Government of Viet Nam on hospital administration on the system

how reliable and comparable results could be obtained

Teaching of the basic medical sciences today

The preventive aspects of medicine do not receive sufficient attention in the medical curriculum and yet without knowledge of these aspects the medical student cannot properly appreciate methods of preventing congenital disease for example nor can he fully understand insecticide control of vector borne disease the resistance of bacteria and viruses to antibiotics or of protozoan parasites to drugs or the application of scientific knowledge to the promotion of health. Moreover it is only if the role of scientific knowledge in prevention is fully grasped by the medical student that the ranks of research workers will continue to be adequately manned.

A WHO Study Group met in 1957 to explore preventive aspects in the teaching of physiology and in 1958 a WHO Expert Committee did the same for pathology. On 22-27 August 1960 an Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel met in Geneva to study the teaching of the basic medical sciences in the light of modern medicine. Its aim was to follow up the work of the two previous groups and review ways and means of introducing the concept of prevention into the teaching of the basic pre-clinical subjects of the undergraduate medical curriculum and to study and promote co-ordination in the teaching of the basic sciences.

The report of this Expert Committee will be reviewed in the Chronicle when it is published.

Conference of national fellowships officers

Last year WHO awarded its 10 000th fellowship. About half of the persons to whom fellowships were awarded studied in Europe whose universities still attract students from all over the world. The WHO Regional Office for Europe makes at present study arrangements for

between 700 and 900 fellows a year about half of whom come from other regions. Most of the technical and administrative work of preparing study programmes for post graduate fellows has been done by medical officers in the receiving countries and these medical officers met in Copenhagen from 22 to 26 August 1960 to discuss their common problems.

The participants in the Conference came from Denmark, France, Germany, Italy, the Netherlands, Sweden, the United Kingdom and the USSR, these being the countries in Europe which receive the greatest number of WHO fellows for training. The United Kingdom alone for example made study arrangements for more than 300 fellows in 1958. Most of the participants are officials of their own countries' health administrations with many years' experience of the WHO fellowship programme. The system employed, known as the inter-country method of work, enables WHO to administer a large fellowship programme with a very small technical and administrative staff of its own. For the success of the programme, however, it is essential that frequent contact be maintained between the fellowship officers of national health administrations and those of WHO. The last meeting of this kind in Europe took place in Geneva in 1955.

The agenda of the Conference contained an item on the selection of candidates for WHO fellowships. The proper selection of fellows is the main guarantee that the considerable funds and efforts devoted to this programme are properly spent. The onus of selecting the best candidates naturally lies mainly upon the governments which propose persons for the fellowship, but both WHO and the receiving government share the responsibility for the selection to help them carry this responsibility. They have vast experience of how the selected fellows go about their studies.

Another important item on the agenda was the preparation of the fellow's programme. Often there are many proposals about the programme from the fellow himself, from his government, from the Regional Office (or Offices if he comes from another region) and from the receiving country's government or the receiving institution or both. The problem is how best to make a synthesis of all these well-intended and useful proposals.

Dr Nelson G Hairston Associate Professor of Zoology at the University of Michigan Ann Arbor Michigan USA has been appointed WHO consultant to the Organization's research programme on bilharziasis. He will be primarily concerned with sampling techniques for the aquatic and amphibious vectors of the disease and with the preparation of forms and records for use in pilot experiments in the field.

Dr Hairston studied at the University of North Carolina and at Northwestern University. While on military duty in Leyte Philippines in 1945 he took part in research on bilharziasis and from 1954 to 1956 he was adviser in medical zoology to the Philippines Bilharziasis Project at Palo Leyte. He has been a WHO consultant in Iraq and at Geneva and in 1959 helped evaluate the work of the Philippines Project. He has been a member of the faculty of the University of Michigan since 1948.

CORRIGENDUM

Vol 14 No 1

Page 9 map of distribution of leprosy

The map on this page may give the impression that there are indigenous foci of leprosy in the south of France. In fact there are only isolated or imported cases as is clear from the text.

—

of reporting and on how to obtain uniformity in medical records

Dr Bridgman who is Deputy Director of Health of the Department of the Seine France is the author of the WHO monograph *The Rural Hospital* and a member of the Expert Advisory Panel on Organization of Medical Care. He has carried out similar assignments for WHO in other parts of the world such as Egypt Turkey and Greece

Rehabilitation in leprosy

A Scientific Meeting on Rehabilitation in Leprosy will be held in the Christian Medical College Vellore India from 21 to 29 November 1960. It will be sponsored jointly by WHO the Leonard Wood Memorial and the International Society for the Welfare of Cripples.

Mr Paul Brand FRCS Professor of Orthopaedics and Plastic Surgery at the Christian Medical College Vellore has been appointed WHO consultant at Geneva to help in the organization of the Scientific Meeting and in the preparation of a guide to principles of prevention and treatment of leprosy deformities and disabilities in leprosy mass campaigns. Mr Brand has worked as a short term consultant in the WHO Regional Office for South East Asia advising the Regional Director and governments on the organization of leprosy rehabilitation. WHO fellows are sent every year to study in his department at the Christian Medical College.

Sprayer evaluation project

A joint malaria eradication and vector control project is to try out sprayers that meet the basic WHO requirements in two countries of differing climatic labour and housing conditions and on the basis of their performance make an approved list of suitable sprayers and prepare replacement and maintenance schedules. In autumn 1959 and in spring 1960 two compression sprayers as yet unused in malaria eradication work and two others only used in the country of their manufacture were tested. In autumn 1960 and in spring 1961 stirrup pump sprayers and certain components of compression sprayers will be tested. In the earlier of these periods the compression sprayer most commonly used in the

field at present was also tested both to provide a standard by which to judge the others and to obtain precise information on its field performance.

Mr Alfred T Lemierre and Mr Robert A Fitzjohn have been appointed to assist in this project. The former received his *doctorat es sciences* from the Institut national agronomique Paris (with specialization in agricultural engineering) a rural engineering diploma from the Ecole du genie rural and a diploma from the Centre des hautes etudes. He has worked as Assistant Director of the Centre de recherches de machines agricoles of the Ministry of Agriculture France and in 1954-1957 was Chef consultant sur essais de machines agricoles to the Organization for European Economic Co operation (OEEC).

Mr Fitzjohn possesses certificates from the Royal Sanitary Institute (now the Royal Society for the Promotion of Health) in hygiene sanitation physiology and building construction and has attended a course at the Ross Institute in London on medical entomology. After five years as a sanitary inspector in England and seven years also in the field of sanitation with the British forces he went to Nigeria in 1946 and has been working there since in malaria projects. He has planned and carried out a number of experiments with and tests of spraying equipment.

The helminthiases

Dr Paul C Beaver has been appointed WHO consultant to review the general problems of the helminthiases other than bilharziasis and filariasis and to assist WHO in outlining the general principles for a programme of research and control with special reference to the common intestinal worms associated with inadequate sanitation—ascaris trichuris and the hookworms.

Dr Beaver is Professor of Tropical Diseases and Hygiene and Head of the Division of Parasitology in the Department of Tropical Medicine and Public Health Tulane University New Orleans Louisiana USA. He studied parasitology at the University of Illinois and has been in charge of malaria and hookworm control in the Georgia Department of Public Health.

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WORLD HEALTH ORGANIZATION

EPIDEMIOLOGY OF PLAGUE

In 1953 a Japanese research team of the Institut Pasteur de l'Iran published the results of its work in the epidemiology of plague in Iran. The authors forwarded a number of new ideas which they felt could be applied in other foci and help solve remaining problems in the epidemiology of the disease.

Investigations of plague epidemics in eastern Mediterranean countries (Turkey, Syria and Iraq), India and Java carried out by the assistance of WHO at the request of the government, had enabled the researchers of the Institute to state the following thesis: A point on the surveys appeared a recent issue of the Bulletin of the World Health Organization.

In the article the following Dr. M. Baltaard discusses the main points of the report.

The first modern epidemiological studies of natural plague suggested that the disease was due solely to highly susceptible rodent species because of the spectacular epizootics among these species. The rodents concerned were either domestic ones headed by the rat, the main cause of human plague, or wild or field species such as the gerbils in South Africa and the Sciuridae in the Asian or eastern European foci (tarabagans, susliks) and in the Americas (ground squirrels, prairie dogs). It is true that in these rodent populations plague always had a tendency to die out because of the very violence of the epizootics. That this disappearance was complete was suggested by the negative results obtained in all investigations of these populations during inter-epizootic periods. However, the continual recrudescence of the disease at the same places in wild foci and its never-ending persistence in certain rural or urban foci where the rat was thought to be the only rodent involved seemed proof of its perpetuation by these highly susceptible species.

A new theory

In 1957 the Institut Pasteur de l'Iran on the basis of its researches in Kurdistan in-

troduced the new idea that highly resistant species play a part in plague epidemiology. The research workers of the Institute enunciated the following basic principle: any species exterminated by a disease cannot be the reservoir of this disease or in other words the true reservoir of a disease must be sought not among the most susceptible species but among those whose natural resistance shows them to be the best adapted to the disease. This principle which may appear self-evident was in fact directly opposed to accepted ideas particularly in the case of plague where resistance to infection had always been considered as a factor limiting its spread.

According to the new theory the true reservoirs of infection were the highly resistant rodent species and the susceptible species were only temporary victims. Once these susceptible species and in particular the rat were regarded as unable to perpetuate the disease the whole problem of plague epidemiology had to be reconsidered especially in the case of the so-called "pure murine foci" (India, Java, Madagascar, Kenya, etc.).

Investigations

The new concept found a very wide audience. In Kenya R. B. Heisch was the first to prove that in one of the most reliably

Bull. Wld. Hlth. Org. 1955, 5: 441

Ann. Inst. Pasteur 1953 85: 41

Bull. Wld. Hlth. Org. 1960 23: 1

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

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For perennial plague to occur it was necessary to have a dense population of very highly resistant rodents capable of surviving the most violent epizootic plague in large numbers—i.e. sedentary rodents able to maintain the infection in fleas in deep permanent burrows with a favourable micro-climate

Temporary foci

Encountered all over the world and throughout history these foci multiplied at the time of the "modern pandemic". They were characterized by a more or less prolonged period of persistence following the introduction of plague. This persistence although suggesting that the disease was permanently implanted was nevertheless followed by its complete disappearance. Responsibility for this temporary persistence had been attributed in most of these foci to commensal rats and its relatively long duration as opposed to the usual brief duration of the historical onslaughts of the disease had been regarded as due to not very clearly specified climatic or local factors.

The survey carried out by the Institut Pasteur de l'Iran in Mesopotamia showed that despite a history marked by frequent reappearances of the infection the focus there was of the temporary type. Similarly surveys in India and Java proved that the foci there despite the uninterrupted persistence of plague for half a century were also only temporary ones from which the disease would no doubt disappear in the very near future.

In all these foci classified as "pure murine foci" research showed that the domestic rat played no part at all in the persistence of plague in rural areas and proved that this persistence was brought about by certain species of field rodents. However these species (*Tatera indica* in India and Mesopotamia *Rattus exulans* in Java) had not the resistance to plague or the density and sedentary nature required to create permanent foci of infection. The epidemiological maps showed and this was confirmed by the investigations that plague

was continually on the move in rural areas. It rarely persisted for more than a year at any one place and continued for several years only in exceptional cases. This temporary persistence existed only in areas where resistant species predominated. In Java for example infection persisted only in regions where *R. exulans* was predominant when plague broke out on the plains in rice growing areas where only highly susceptible species were to be found it rapidly subsided.

Phenomena of the same nature (intervention of a resistant species) would seem to explain the persistence of plague in certain ports as opposed to its usual brief duration in inland towns. The presence in these ports in addition to *R. rattus* of the species *R. norvegicus* which is considered to be naturally resistant to the infection and is not found in inland towns might play a part in this persistence. Finally the data on persistence in ports had for the most part been falsified by the frequent reintroduction of infection particularly by shipping during the period when they were established.

Spread of infection

The traditional theory according to which the rat alone was responsible for the genesis of human plague offered no satisfactory explanation of the way in which the infection advanced from village to village in India and Java and in general everywhere where plague had appeared and had spread in rural areas. Indeed ever since the beginning of the century investigations had shown the extraordinarily sedentary nature of *R. rattus* whose area of movement was restricted and never extended from village to village. The "passive transport" of rats which was known to be responsible for the spread of plague along railways or navigable rivers was suggested as an explanation. However systematic examination of passengers' carts and even of baskets carried from place to place soon showed that such "transport" did not occur in rural areas. There remained the somewhat fanciful suggestion that infected rat fleas were carried from village to village in clothing or objects and produce. Investiga-

established pure murine foci anywhere in the world *Rattus rattus* played no part in maintaining the disease and autonomous wild rodent plague existed based on highly resistant species. In the USA investigations in the inveterate western foci were directed at the instance of K F Meyer towards species resistant to the infection and rapidly revealed the primary role played by some of them (Microtinae Cricetinae). In the USSR despite the firmly held belief that marmots and *Citellus* (susliks) played a predominant role a number of workers turned their attention to the resistant species Gerbillinae including several species of *Meriones* and the gerbil *Rhombomys opimus* Cricetinae (*Cricetulus*) Microtinae (*Alticola* and *Microtus*) and even Lagomorpha (*Ochotona*) were then incriminated. These species which for the most part had already been recognized by Soviet workers as being subject to infection and whose resistance was known or had recently been demonstrated are now considered⁴ to play the principal role in most areas of permanent infection.

Finally WHO gave the Institut Pasteur de l'Iran an opportunity to extend its investigations by entrusting it with a series of epidemiological surveys requested by the Governments of India Java Iraq Syria and Turkey. These surveys took place from 1954 to 1957 in collaboration with national teams the Institute meanwhile continuing its work in Iranian Kurdistan. This group of investigations in conjunction with those commenced in Morocco in 1941 by the Institut Pasteur du Maroc under the leadership of Georges Blanc covered practically all aspects of plague throughout the world and made it possible to solve a number of controversial questions relating to the epidemiology of the disease.

Permanent foci

The Institut Pasteur de l'Iran had originally announced that the Kurdistan focus was "a focus of pure *Meriones* plague. Classifications by taxonomists specializing in the *Meriones* genus indicated the presence of

three species only which were shown experimentally to be highly resistant to plague. The workers of the Institute were thus led to carry to its extreme limit their theory of the predominating part played by resistance to the disease by concluding that plague can thus maintain itself only in highly resistant rodents.

Further researches in Kurdistan were to show definitely that serious confusion existed in the classification of the genus *Meriones* which had already been repeatedly modified by the experts. The Institute undertook the study and reclassification of the *Meriones* of Kurdistan with help from biologists cytologists and taxonomists. This reclassification revealed profound differences between the species of this genus superficially so homogeneous. One of these differences was concerned precisely with susceptibility to plague. Four (and not three) species existed in Kurdistan and were found throughout the area investigated which had been extended in the meantime to Iraq Syria and Turkey. Only two of these species *M persicus* and *M libycus* possessed the resistance regarded as the *sine qua non* for the continued persistence of the disease the two other species defined in the course of reclassification *M vinogradovi* and *M tristrami* were on the contrary highly susceptible to plague. In each of the permanent microfoci studied in Kurdistan there were at least one of the resistant species and at least one of the susceptible species closely mingling in their habitat. Thus while other workers were recognizing the basic role played by resistant species in plague among susceptible species in inveterate foci the Institut Pasteur de l'Iran came to the conclusion that the presence of susceptible species able to start epizootic infection afresh among resistant species was necessary to maintain such foci. The main cause of the perennial nature of plague in inveterate foci could thus be defined as the presence of a resistant rodents susceptible rodents complex.

However research in temporary foci was to show that this was not sufficient cause in itself. The mere presence of resistant species could bring about only temporary persistence

end of the season and was able to maintain itself throughout the off season was considered sufficient to ensure the carry-over of plague from one season to the next

The investigations of the Institut Pasteur de l'Iran showed that in the rural areas even at the height of the infection this carry-over phenomenon was too rare and scattered to explain the large number of points where plague revived at the beginning of the following season. Moreover an epidemiological chart covering four so-called "endemic" districts over the previous thirty years indicated large areas each year where no village showed the carry-over phenomenon nevertheless plague reappeared in these areas at the beginning of the next season. For the most part it reappeared not in the villages which were the last to be infected at the end of the previous season but in villages nearby or even a few kilometres away in areas which had remained free from infection during the preceding season. Finally investigations in several villages revealed a high murine mortality rate which confirmed the extreme rapidity with which the infection normally disappears in the case of the rat.

These investigations also showed the part played by field rodents. The gerbil *Tatera indica* which was the most common of these rodents in the plague area resisted infection in sufficient numbers in the territory attacked by the epizootic to maintain flea infection during the hot season in its deep closed burrows where it was sheltered from unfavourable climatic conditions. Study of the regions flooded each year by the monsoon confirmed the role of this rodent at the beginning of each season plague first reappeared in these regions in villages situated on higher land which could not be flooded and where the gerbil burrows had escaped destruction.

Giving this explanation of the persistence of rural plague in which the domestic rat played no part the research workers of the Institut Pasteur de l'Iran suggested that in urban areas the rat might well be able to find conditions lacking in the villages in respect of numbers and distribution breeding places protected against climatic conditions (cellars

and drains) and the presence of populations or individuals resistant to the infection.

Epidemic development of plague

Immediately after Simond's discovery of natural plague in wild rodents the work of the Plague Research Commission in India and of the Dutch in Java confirmed by numerous investigators all over the world firmly established the theory that the rat alone was involved in the genesis of human plague. Every case of human bubo-septicaemic plague was thus due to the bite of fleas from rats which had died of the disease. However this theory did not explain everything. Although it was indisputably true for modern plague in the form then prevalent in India or Java for example the fact remained that in those countries the infection was endemic rather than epidemic in nature and spread slowly unlike the sudden explosive outbreaks of the past. On the discovery somewhat later of the first foci of wild rodent plague where rats were not involved in investigations showed that human plague was rare or exceptional in these foci. It thus seemed certain that bubo-septicaemic plague epidemics did not occur in the absence of the rat the only rodent able to introduce *Xenopsylla cheopis* which experimental research has shown to be the best vector of the disease into the human habitat.

The studies of the Institut Pasteur du Maroc in 1941 in a focus where human plague was present in its "historical" explosive form were to reveal the role played by human ectoparasites in the development of epidemics. Nevertheless the presence of the rat in this Moroccan focus the simultaneous existence of a violent murine epizootic and the presence in houses in the very clothing of persons who had died from plague of infected *X. cheopis* led most epidemiologists to dispute the findings of the Moroccan workers.

The first publications of the Institut Pasteur de l'Iran raised anew the question of interhuman transmission in regard to the Kurdistan plague focus a wild rodent focus without rats where there had never

tions in India and Java showed however that this occurred only rarely

It was the discovery of field rodent infection in these foci that eventually explained the slow regular advance of rural infection. Research showed that plague moved forward step by step borne by field rodents from field to field from burrow to burrow in thin epizootic trails winding across the country side infecting village rats in passing and thus setting off murine epizootics which led in turn to human infection. The sporadic nature of infection in villages i.e. the fact that in the midst of infected territory many villages remained free from the disease was due to the capricious nature of these epizootic trails and not as had been suggested the chance small scale transport of infected fleas by man

The seasonal nature of plague

Another point which remained obscure in the epidemiology of the disease was the very curious phenomenon of plague seasons in India the incidence of plague drops greatly every year at the beginning of the hot season and rises again only after the end of the monsoon. Long and difficult experimental work carried out by leading experts under varying climatic conditions had shown that heat particularly when combined with drought influences the multiplication of fleas their infection by plague and their vector potential. This explanation however did not fit in with certain facts in certain countries as for example Java under climatic conditions practically identical with those obtaining during the monsoon season in India plague was continuously present in India itself moreover although plague declined considerably in the off season it nevertheless continued to exist both in urban and in rural areas

The investigations of the Institut Pasteur de l'Iran showed in fact that in the rural areas it was only the spread of plague and not the disease itself which came to a standstill at the end of each spring. In the north of India practically no more villages became infected later than the beginning of June

Village plague being usually of brief duration infection had by then died out in the villages infected at the beginning of the season and there was accordingly a rapid decrease in the number of plague stricken villages. Observation showed however that in these villages the infection followed a normal course despite the heat and drought. The number of rats and fleas and the incidence and duration of murine and human plague were apparently the same there as at the height of the season.

Research indicated that this seasonal phenomenon depended primarily on the field rodent factor. From May onwards all species of rodents in the fields commenced aestivation closing themselves in their burrows and living on stored food reserves. Thus the epizootic ceased to advance in the fields and at the same time contamination of village rats came to an end. When the field rodents again became active that is in mid October when the monsoon floods had dried up the epizootic revived in the fields and murine followed by human plague soon reappeared in the villages.

It is possible that if a study were to be made of the movements of rodents in towns during the hot season it might reveal something of the same nature which would explain the seasonal cessation of the epizootic in urban areas.

Interseasonal persistence (carry-over)

This seasonal phenomenon raised another question where and how did the infection persist during the off season period which lasts for nearly five months? As regards urban plague the question seemed to have been solved at the beginning of the century the Plague Research Commission which worked in Bombay for a whole year (October 1905-September 1906) had shown that although rat plague became rare during the off season it nevertheless did not cease to exist. Studies by Indian research workers in the large ports subsequently confirmed this. In the rural areas the degree of persistence of plague (human cases murine mortality) in the few villages where the disease appeared at the

The fate of plague

Nevertheless plague still clings to those positions where biological conditions have favoured its permanent establishment. Our present knowledge of these conditions enables us to identify most of the foci concerned and to measure their considerable extent during half a century plague by increasing the number of its permanent foci has more than doubled its area of distribution now on a world wide scale as a result of territorial gains such as those in South Africa and the Americas.

However it can safely be affirmed that the disease will never again have the opportunity it had at the beginning of the modern pandemic it has been banished from the high seas and the great ports have been closed to it. On the seas plague is now carried—as in the past—only in coastal waters by small boats which are neither rat proof nor deratted and between ports still without facilities or supervision. Such ports however are still in the majority and all over the world lighters, junks, sampans and coasters of all kinds remain rat infested. Oceanic plague has disappeared but maritime plague remains and certain areas offer it the same scope as it had in the past. It is safe to say that there will never again be a plague pandemic. It is certain however that with its inherent epidemic tendencies the disease will occasionally flare up in localized outbreaks and show that it is still a force to be reckoned with. While plague is at present quiescent this must not blind us to the fact that the positions it holds are stronger than ever entrenched within reach of all the strongholds of modern civilisation. It may well be a disease of the future.

Recent gains in knowledge permit us to have a better idea of this future. It seems certain that the introduction of murine infection into a plague free area can only occur where *R. rattus* exists and that the ensuing epizootic will be brief if *R. rattus* alone is present and can only be prolonged if *R. norvegicus* is also found. It would seem certain that a focus can develop only where the infection can become established in wild or field rodents. This focus will be only tem-

porary if too low a resistance and too high a mortality among these rodents prevent the infection from settling in one place and force it to keep moving into new areas in order to survive. On the other hand inveterate foci will develop where sufficiently resistant species occur and a balance of infection is maintained between resistant and susceptible species.

Prophylaxis

Our better knowledge of the means whereby plague can spread should also make it possible to define control measures more clearly. In respect of quarantine prophylaxis of the human infection remains unchanged since the International Sanitary Regulations have wisely retained through successive modifications the provision specifying disinsection of patients and suspects as well as of their baggage, bedding and linen. Thus the principle of preventing the interhuman transmission of bubo-septicaemic plague by human ectoparasites whose importance has been shown above has been safeguarded. Similarly the prevention of murine infection by rat proofing or traditional deratting as defined in the International Sanitary Regulations remains valid both for immediate and long term prophylaxis.

Nonetheless the WHO Expert Committee on Plague recognized that the Institut Pasteur de l'Iran was correct in pointing out the inaccuracy of the word "rodents" in certain definitions appearing in the International Sanitary Regulations. The Committee recommended its replacement by the word "rats" thus specifying that only those areas where rat plague is active (and not for example permanent plague foci among wild rodents without murine plague) should be declared "infected local areas" and treated as such from the quarantine standpoint.

For immediate national and long term international prophylaxis far reaching changes in the accepted regulations are necessary. As regards immediate prophylaxis there should be no deratting which is a waste of time, labour and money. It should be replaced by the thorough disinsection of houses and their occupants thus breaking in one

theless been epidemics of bubo septicaemic plague

Further research by this Institute was to provide a solution for the problem. It confirmed the extreme rarity if not absence of human ectoparasites in rural areas in India as in Java. At the same time however it showed that plague was not—and in fact never had been—of an epidemic nature in the particular environment concerned. The history of the human infection which was studied in a large number of villages showed that plague caused only a series of spaced sporadic cases there and that these were few in number at any one time. The epidemic aspect of plague in India and Java was only a statistical one—the systematic addition of cases by canton district province etc giving enormous figures in periods when the disease was distributed over a wide area.

On the other hand investigations in the rural foci of Syria, Turkey and Iraq where human bubo septicaemic plague had on many occasions taken on the same historical epidemic aspect as in Iranian Kurdistan revealed the same complete absence of the rat and the same high density of human ectoparasites. Proof of interhuman transmission in these foci was obtained in Iran where during a village epidemic the plague bacillus was isolated from specimens of *Pulex irritans* captured in the houses of persons who had died from bubonic plague ten days before hand.

The controversy regarding the way in which plague becomes epidemic was thus complicated by the application of the word epidemic to two different phenomena. The creation of the word "anademic" was suggested to designate the addition of sporadic cases as opposed to the multiplication of cases by the process of interhuman transmission leading to an epidemic.

The decline of plague

The decline of plague throughout the world over the past 15 years has been large scale and rapid though this in no way means that plague can be written off. It marks however the close of a unique period in the history

of plague—the period of the modern pandemic in which the invention of the steamship enabled the disease to spread throughout the world. Today's situation reflects the success of a gigantic attempt—the first that could really be called international—to make good one of the most tragic consequences of human progress.

From the beginning of the century the successive sanitary conventions imposed increasingly heavy obligations on the ever growing number of countries bound by them. Measures involving enormous expenditure of effort and money were continued for years with a tenacity all the more meritorious in that the results were always disappointing. These measures included the search for and systematic examination of rats in ports and on vessels, the destruction of refuse, the separation of drains in ports, attempts to prevent the embarkation and disembarkation of rats and in particular the employment of rat poison and the periodic fumigation of ships.

It was the application of rat proofing that finally led to the gradual elimination of the rat from shipping. The value of this method conceived and applied in the USA as early as 1907 was only officially recognized in 1926 when the Paris Conference introduced deratting exemption for rat proof vessels into the International Sanitary Convention. It did not become really general until just before the Second World War. Not only does rat proofing eliminate *R. rattus* from vessels at sea but its application to new buildings is also gradually eliminating the species from the large ports as they become modernized. At the same time the resistant species *R. norvegicus* which is unaffected by modernization at the ports is multiplying. The antagonism between the two species is helping to bring about the complete disappearance of *R. rattus*. The world wide decline of the infection is commencing one after the other a number of foci which appeared to be firmly established are dying out. Bit by bit plague is losing the ground it gained temporarily during the half-century of the modern pandemic: its latest and most spectacular losses being in India and Java.

held that while the evidence did not provide a clear indictment of any one constituent of the fog, the conclusion was inescapable that the excessive mortality and increased incidence of respiratory infection during and immediately after the fog were the result of irritation of the respiratory tract by contaminants of the fog—the irritants mainly responsible probably being derived from the combustion of coal and its products and their lethal effects being almost wholly exercised on persons suffering from chronic respiratory or cardiovascular disorders.

This was not the first time that air pollution has been blamed for producing ill effects on health in London. The English Parliament had passed an act as long ago as 1273 for bidding the burning of coal in London and in 1306 a man was executed for doing so. The law quickly fell into abeyance as the shortage of wood as fuel became more pronounced and when the Industrial Revolution came attempts to prevent the pollution of the atmosphere were unavailing. Towards the end of the nineteenth century big increases in mortality occurred in association with periods of severe fog in 1873, 1880, 1882, 1891 and 1892.

Air pollution and its evil effects were not and are not confined to England; the home of the Industrial Revolution. There was a notorious occurrence in 1930 in the Meuse valley in Belgium associated with anti-cyclonic conditions, cold fog and heavy industry. In 1948 the industrial town of Donora, USA, some 30 miles south of Pittsburgh was afflicted by a heavy fog, from 27 to 31 October 5910 persons (42% of the population) fell ill, 15.5% mildly, 16.8% moderately and 10.4% severely, 17 persons died. There was also the Poza Rica incident of 1950 in Mexico. Mention should be made too of the recurrent "smog" of Los Angeles occurring during the summer and early autumn and causing irritation of the eyes, nose and throat, damaging vegetation and making the atmosphere hazy.

Wherever men collect they tend to pollute their environment. Throughout human history towns have been concentrations of refuse and dust, with rivers and wells polluted

by waste materials and ground water contaminated—and as a corollary they have been breeding grounds for vermin and bacteria and centres of epidemics. The dangers of impure water and the indiscriminate disposal of sewage and refuse have slowly been recognized however and it is safe to say that practically all towns of reasonable size in the world pay at least lip service to the ideals of pure water and sanitary disposal of sewage and refuse.

Only relatively recently has so much attention been paid to pollution of the air. The biological processes of living matter, certain natural phenomena and many of man's activities—especially since the Industrial Revolution—result in the liberation of gases, vapours, dust and aerosols of suspended particles into the air and some of these atmospheric contaminants are harmful to health. The study of the nature, properties and behaviour of the contaminants is difficult and requires the co-operation of physicists, chemists and biologists. The polluting gases and vapours may form a proportion of only a few parts per million or even one part per thousand million or less, but the toxicity of some compounds in the parts per thousand million range may be greater than that of others in the parts per thousand range. Some of the contaminants have not been identified and it will be years before full information becomes available on many aspects of air pollution, so complex is the subject, so many and changing the factors involved. Whereas the industrial hygienist works in a semi-closed atmosphere where concentrations are higher than in the street and conditions are somewhat simpler, so that sampling processes lasting only a few minutes are usually sufficient to give him a picture of what is taking place in the factory, sampling processes in the open air must usually continue for months and often for years before the factors involved in air pollution are understood. Thus the forms of pollution encountered in Los Angeles since 1945 are still not well understood although measurements have been proceeding for over ten years.

Nevertheless an appreciable amount of knowledge exists about air pollution and its

operation the chain of infection from rat to rat from rat to man and from man to man. There should be no vaccination which is too slow and unreliable for immediate prophylaxis but chemoprophylaxis by means of sulfonamides. There should be no *cordon sanitaire* or isolation measures since these are rendered pointless by disinsecting chemoprophylaxis of contacts and treatment of patients with sulfonamides or antibiotics.

As regards long term prophylaxis in infected territory once it had been demonstrated that wild or field rodents alone play a part in the maintenance and propagation of the infection it seemed logical to carry out eradication campaigns based on the destruction or at least disinsection of field rodents and their burrows. Because of certain prejudices arising from previous failures public health authorities were at first reluctant to undertake such campaigns but the success of those carried out in certain inveterate foci in the USSR showed that they were the only means of obtaining lasting results.

Where long term prophylaxis at the international level is concerned certain definitions (as in the case of yellow fever) appear to be

called for i.e. the definition of receptive areas as those where *R. rattus* exists side by side with a sufficiently numerous and vulnerable field rodent fauna of critical areas as inveterate wild foci together with the ports even if free from infection situated in their neighbourhood and finally of "immune areas" as areas free from *R. rattus* together with the neighbouring ports. These definitions might permit the immediate preparation of agreements for international assistance in the event of the invasion of a receptive area by plague. In this way the threatened country could be provided with everything necessary to ensure the rapid eradication of the disease before it had time to take root and spread.

An international programme for the detection and delimitation of critical areas should be drawn up making it possible to designate infective ports and to plan the eradication of plague in the areas concerned. In the third report of the WHO Expert Committee on Plague⁵ a programme of this type headed the Committee's Recommendations for co-ordinated research.

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AIR POLLUTION

In December 1952 many parts of the British Isles were covered by an anticyclone. It was cold and fog was widespread particularly in and around London which remained blanketed in it for five days. Within about 12 hours from the beginning of the fog the morbidity rate in the Greater London area became very much higher than usual for the time of the year. The common form of illness experienced was characterized by a relatively unproductive cough nasal discharge sore throat and sudden attacks of vomiting and was especially severe in persons who had had a previous history of chest trouble. In the very ill dyspnoea cyanosis moderate fever and rales and rhonchi indicative of bronchospasm and the presence of bronchial secretions were present. Men were affected more than

women and most of the sick were over 45 years of age. There were appreciably more hospital admissions than usual particularly for cases of acute respiratory infection but also for heart disease. The mortality records showed that during the week of the fog and the week after there were 4000 deaths more than the average. Most of the people who died were recorded as having had chronic bronchitis bronchopneumonia other lung disease or disease of the heart.

During the fog the smoke concentration was found to be five times greater than at other times the sulfur dioxide concentration about six times greater. A Committee on Air Pollution set up in 1953 by the Government of Great Britain to examine the nature causes and effects of air pollution and the efficacy of present preventive measures."

held that while the evidence did not provide a clear indictment of any one constituent of the fog the conclusion was inescapable that the excessive mortality and increased incidence of respiratory infection during and immediately after the fog were the result of irritation of the respiratory tract by contaminants of the fog—the irritants mainly responsible probably being derived from the combustion of coal and its products and their lethal effects being almost wholly exercised on persons suffering from chronic respiratory or cardiovascular disorders

This was not the first time that air pollution has been blamed for producing ill effects on health in London. The English Parliament had passed an act as long ago as 1273 forbidding the burning of coal in London and in 1306 a man was executed for doing so. The law quickly fell into abeyance as the shortage of wood as fuel became more pronounced and when the Industrial Revolution came attempts to prevent the pollution of the atmosphere were unavailing. Towards the end of the nineteenth century big increases in mortality occurred in association with periods of severe fog in 1873 1880 1882 1891 and 1892.

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Only relatively recently has so much attention been paid to pollution of the air. The biological processes of living matter certain natural phenomena and many of man's activities—especially since the Industrial Revolution—result in the liberation of gases vapours dust and aerosols of suspended particles into the air and some of these atmospheric contaminants are harmful to health. The study of the nature properties and behaviour of the contaminants is difficult and requires the co-operation of physicists chemists and biologists. The polluting gases and vapours may form a proportion of only a few parts per million or even one part per thousand million or less but the toxicity of some compounds in the parts per thousand million range may be greater than that of others in the parts per thousand range. Some of the contaminants have not been identified and it will be years before full information becomes available on many aspects of air pollution so complex is the subject so many and changing the factors involved. Whereas the industrial hygienist works in a semi-closed atmosphere where concentrations are higher than in the street and conditions are somewhat simpler so that sampling processes lasting only a few minutes are usually sufficient to give him a picture of what is taking place in the factory sampling processes in the open air must usually continue for months and often for years before the factors involved in air pollution are understood. Thus the forms of pollution encountered in Los Angeles since 1945 are still not well understood although measurements have been proceeding for over ten years.

Nevertheless an appreciable amount of knowledge exists about air pollution and its

effects on human health. This knowledge is summed up in a WHO monograph that has just been published.¹ In this volume which is the work of an international group of experts a historical review of atmospheric pollution is followed by sections on sampling and analysis of the contaminants, the instruments used, the physical and chemical nature of air pollution, the role of meteorology, the effects of air pollution on human health, animals and plants, the economic and social aspects of air pollution, the control of pollution by site selection and zoning and by process changes or equipment, fuel selection and utilization, air pollution legislation, standards and enforcement, and finally—and topically—radioactive pollution of the atmosphere.

By the end of the nineteenth century practically everything that is now known about the causes of smoke—the visible cloud of suspended carbon particles that is the first and most obvious of the pollutants of the air—and its elimination had already been said in Great Britain. But smoke was not eliminated because it is a by-product of activities producing goods and profits and thus commanding the attention and support of financial interests. Moreover the damage done by smoke, though considerable, was not very clearly visible to the individual smoke producer because widely spread and since the damage was due to a large number of small producers a clear relationship between cause and effect was not easy to establish nor for the same reasons could the blame readily be pinned upon definite persons who could be asked to remedy the situation. In American cities a few decades later it was found that even when public opinion was convinced of the need for smoke reduction there was reluctance to take the necessary measures, the attitude always being that the responsibility for doing so was someone else's. Circumstances have helped some countries in the campaign to abate the smoke nuisance: in the USA supplies of oil and natural gas which burn with little or no smoke became more freely available. Even

so it became necessary for states and municipalities to pass laws to make it compulsory for householders and industries to burn smokeless fuels or to use more efficient equipment to burn fuel. In Great Britain there was no natural gas; oil had to be paid for in foreign currency and even if industries could be compelled to install more efficient machinery for getting rid of smoke the main problem would be to prevent the domestic consumer of coal from continuing to burn it wastefully in open grates. A considerable proportion of the air pollution of the great fog of 1952 in London was attributable to smoke from fires burning in innumerable open grates throughout the metropolis.

Smoke is not by any means the only atmospheric pollutant. Grit and dust, sulfur dioxide from coal and smelters, hydrochloric acid from such processes as the production of sodium carbonate from common salt, hydrogen sulfide from tar distillation, nitrogen dioxide from the chamber process for sulfuric acid, hydrogen fluoride from the production of superphosphate and aluminium, lead, arsenic, zinc and copper derivatives from the metallurgical industries, finely divided beryllium from the manufacture of radio valves, hydrocarbons, aldehydes and olefines from combustion of oil, carbon monoxide from a variety of sources all enter the air to join the sulfur dioxide, hydrogen fluoride and hydrogen derived from volcanic disturbances, the hydrogen sulfide from seepage of natural gas, volcanoes or action of sulfide bacteria, the ozone formed photochemically or by electric discharge, the dust and aerosols consisting of salt particles from sea water, particles from soil and vegetation, dust of meteoric origin, bacteria, spores and pollen. The concentration of the substances not contributed by man is extremely low except in the immediate vicinity of natural sources but the concentration of those contributed by man can, under meteorological conditions aiding or in the industrial centres themselves, be high enough to be injurious to health and has been the subject of much industrial legislation. This legislation has on the whole been concerned with conditions in the factory or workshop

¹ *Air pollution (World Health Organization Monograph Series No. 46) 1960 G n*

itself not to any great extent with conditions outside

The complete list of atmospheric contaminants that are harmful to the health is not known. In Los Angeles it was at first thought that sulfur dioxide was the main irritant in the smog but now the list of substances currently considered to be causally related includes as well oxides of nitrogen aldehydes ketones acids chlorinated hydrocarbons acroleins (or an "acrolein like substance") chlorinated aldehydes and related substances formyl compounds ozonides and peroxides of hydrocarbons of the series present in gasoline (especially the straight-chain hydrocarbons containing double bonds) ozone nitro-olefines peracylnitrites organic free radicals and carbon suboxide. This is a formidable list but it is not exhaustive. It is considered that the gases and aerosols discharged into the air may not be irritant in themselves but may be acted upon by the ultraviolet rays of the sunlight and the resulting syntheses may be the smog forming substance or substances. The present view is that the oxides of nitrogen and hydrocarbons (mostly olefines) both arising from combustion processes especially of petroleum products are involved in the photochemical changes that take place with appreciable increase of the amount of ozone in the air. In other words more important than the combustion of coal and allied products—which were the main cause of the London fog of 1952—is the combustion of gasoline by the well over 2 million motor cars in Los Angeles with their consumption of over 5 million gallons of gasoline daily.

A great deal remains to be found out about the effect of atmospheric contaminants on the human body. The biochemical reactions they produce vary: they may corrode like sulfuric acid or react with cellular proteins like the aldehydes. They may be strong oxidizing agents like ozone or interfere with enzyme systems within the cell. They may like the nitro-olefines affect the eyes and the lungs. They may act on the upper part of the respiratory tract or aerosols may aid the irritants to gain access to the lower part. Irritation of the upper part may cause reflex spasm of the distant bronchioles and severe symptoms

and very fine particles generally classified as "inert" may cause bronchoconstriction apparently by virtue of an unexplained local irritant action. The lining of the bronchi may suffer from interference with its cleansing system and the secretory rhythm of the mucous glands may be impaired or there may be severe inflammatory response in the mucosa with desquamation of the surface epithelium. Hypersensitivity and hyperirritability may occur. The reports on acute air pollution episodes indicate that the damage was due to local action of the pollutants on the exposed membranes and that when the respiratory tract was affected in some susceptible persons secondary adverse effects on the heart became manifest. The short term effects of an increased concentration of atmospheric contaminants on persons suffering from previous disease of the lungs or heart have been shown in the London and Donora episodes. What the long term effects of these contaminants in lower concentrations may be both on those with previous disease and those without still remains to be elucidated. Among the possible effects is the stimulation of cancer.

Nor does air pollution affect only human health. The economic and social effects are considerable. Livestock and plants suffer materials and their protective coverings corrode houses and other buildings need increased maintenance inside and outside chimneys and motors and other engines carry an unburnt residue technical measures are required to suppress or reduce the smoke or emissions from factories the removal of dust and the treatment of smoke mean increased use of electric power transport costs go up in times of smog or fog more electricity is used for lighting pollution control requires the organization of a service to carry it out research into the many complex problems of pollution cannot be done without funds. The social consequences are not easy to assess. In the United Kingdom however they may be seen in the drift of the population from the grimy smoke blackened towns of the North of England to the relatively less polluted South with the vast effects on the community that this may have.

It must not be assumed that air pollution is confined to the industrial nations of Europe and North America for industry is spreading throughout the world carrying pollution in its wake. In Mexico City for example the average visibility up to 1940 over the city was between 10 and 20 km now it is hardly more than 4. During fine weather about 5 tons of dust and grit are deposited per square kilo metre per week over the city (15 in the centre). Many tropical cities enjoy a climate of warm sunshine and gentle breezes but this is a positive disadvantage as far as air pollution is concerned because they are not like so many industrial towns of more temperate zones washed and ventilated by rain and wind.

Attempts to remedy air pollution date back in some countries to many years ago but as one contributor to the WHO monograph says³

With few exceptions air pollution control legislation in the various countries is inadequate. A frequent disadvantage is that the first control measures were introduced many years ago and the legislation at present in force takes no account of the enormous growth of industry, new types of air contaminant and new sources of pollution such as motor vehicles and heating installations. Some laws provide solely for the payment of compensation for damage caused by air pollution."

In the United Kingdom a Public Health Act of 1936 constituted as statutory nuisances any industrial installation for the combustion of fuel that did not as far as practicable prevent the emission of smoke and any chimney (except a chimney of a private house) emitting smoke in such a quantity as to be a nuisance. A local authority could serve notice on the offender requiring him to abate the nuisance and if the notice were not complied with he could be brought before a court fined and ordered to comply. Local authorities could also make by laws regulating the emission of smoke. Unfortunately the local authorities often did not take action against offenders and

failed to use their powers to make by laws. As a result of the London smog of 1952 however a Committee on Air Pollution was set up⁴ and a Clean Air Act was passed in 1956 that incorporated many of its recommendations. Under this act it is an offence to emit dark smoke from a chimney for longer periods that may be specified by the Minister of Housing and Local Government: no furnaces other than small ones for mainly domestic purposes may be installed unless they can be operated as far as practicable continuously without emitting smoke; apparatus may be required to be provided to record the density or darkness of the smoke and smoke control areas may be created. Other provisions cover the height of chimneys, mine refuse road traffic smoke from railway engines and ships, grit and dust pollutants from chemical and other processes and electricity generating stations.

In the USA there is no general legislation on air pollution only state or local regulations but almost every city now has some form of regulation and it is often more stringent than the law in the United Kingdom restricting the type and quality of the coals used in hand fired furnaces and domestic heating appliances, the density of the smoke emitted or the amount of grit and dust allowable. The result has been an astonishing improvement of the air in some cities as for example in Pittsburgh.

In most other countries legislation is out of date and inadequate to deal with the situation.

In the present state of knowledge complete elimination of pollution is not practicable but there could be much greater improvement than has so far been achieved. Such improvement will only be obtained by better legislation more effectively administered, increasing knowledge based on intensified research and development work and a more determined public opinion. As new industrial processes are developed and conditions changed modifications in legislation and methods of enforcement will be required from time to time but it must be recognized that no one set of preventive measures will meet all

needs everywhere owing to differences in the conditions in various countries and localities

The study of the problem of air pollution has received a new impetus from the arrival of nuclear energy on the world scene and the great expansion in the use of radioactive materials. The dangers of radioactivity are well known because of the mishaps that have occurred over the relatively long period in which X rays and radium have been used but these dangers have been confined to the laboratory and as much as possible mitigated. The release of radioactive waste into the atmosphere with its possible effects both on the living and the unborn has stimulated inquiry into the radioactivity of the air factors involved in its differing concentrations the fate of radioactive contaminants radiobiology and radiotoxicology methods of measuring maximum permissible levels and ways of prevention. This inquiry must result in advances in knowledge of the other contaminants of the air and it may be that concern about the consequences of radioactive pollution will lead to greater concern about the other forms of pollution as well

Parker A. (1960) *Air pollution legislation and its enforcement* 1. *Air pollution* p. 380

The public health worker should be aware of the problem that air pollution represents. To give some figures for one of the countries where pollution is most serious in the United Kingdom over a million tons of smoke are emitted yearly from domestic fires half a million from industry and 100 000 from the railways. Out of 900 000 tons of grit and dust liberated into the air domestic chimneys emit 100 000. Sulfur dioxide emitted amounts to 5.5 million tons (the domestic fires emitting nearly a million of this).⁶ These figures give some idea of the extent of the problem in some countries and the uphill task involved in restoring some measure of purity to the air. It is a task that will need intensive research the collection and dissemination of knowledge already acquired and to be acquired in the future the creation of a special administration the passing of appropriate legislation and the training of officials in the methods of control. Above all it will need the backing of public opinion. This can only be obtained by systematic education of the public by inculcating the feeling that any emission of pollutants into the atmosphere is an offence that cannot be countenanced whether the offender is industry or the private individual.

National Society for Clean Air (1960) *Clean air year book for 1960*. London (Quoted in *Nature* 1960 187 00)

The Holy See supports malaria eradication

The Holy See has made a symbolic contribution of \$1000 to the WHO Malaria Eradication Special Account. On behalf of His Holiness Pope John XXIII a cheque for this sum has been presented to Dr M. G. Candau, Director-General of WHO, by the Reverend Father Henri de Riedmatten, O.P., Ecclesiastical Adviser of the International Catholic Organization for the Information Centre. In presenting the cheque, the Reverend Father de Riedmatten stated that it represents not merely a sign of approval of the malaria eradication campaign but also an appeal to the generosity of Christians everywhere in favour of this campaign.

EPIDEMIOLOGICAL PROBLEMS OF DISAPPEARING MALARIA

When a malaria eradication campaign approaches the end of the attack phase and transmission has been substantially reduced new problems arise. In particular it is important to ascertain the exact amount of malaria still persisting in the community before deciding to discontinue regular spraying and start the consolidation phase. The classical methods of measuring malaria prevalence are inadequate for tracing the few remaining cases and other methods have therefore been developed. An epidemiological factor of particular importance in the final stages of eradication is the part played by the asymptomatic carrier. An article on the subject by Dr P. Yekutieli appeared in a recent number of the WHO Bulletin¹ and is summarized below.

An eradication programme requires continuous evaluation starting either before or in the very earliest part of the preparatory phase and continuing until the end of the programme. The techniques to be used vary greatly at different stages of the programme. Once the phase of attack starts, evaluation must concern itself with malaria as a dynamic condition which is rapidly diminishing and later disappearing and techniques adapted to this dynamic stage. Many of them relatively new must be adopted.² The classical method of the malariometric sample survey based on the determination of spleen and parasite rates offers no more than a purely static measurement of malaria prevalence at a given moment. The data it gives are certainly useful in the preparatory phase and in the first two years of the attack phase. But as soon as parasite rates have dropped to between 1% and 3%—usually in the second year of the attack phase—the indices furnished by malariometric surveys are no longer sensitive enough to measure further progress. What is needed is a method that will measure the prevalence of malaria in a continuous way and for the whole population. The malaria case detection method serves this purpose. It is based on the taking of blood slides from all fever cases encountered during regular visits to houses by antimalaria staff (active detection) or during consultations at dispen-

saries or fever posts (passive detection). The number of cases detected by this method during one calendar year expressed as a proportion of the total population constitutes the incidence rate on which depends the decision whether to interrupt spraying and start the consolidation phase.

The fact that this method gives more precise results than the malariometric survey does not mean that it should replace it for each method has its own uses. It is obviously impossible for technical and financial reasons to employ a case detection method covering the whole population right from the beginning. When this was done in programmes in the Americas there was often a continual increase in the number of cases found which almost always reflected growing coverage of the population rather than any real increase in malaria morbidity. As a result it became impossible to assess the effects of spraying operations during the first two years.

A possible solution is to use malariometric surveys during the first two or three years for an overall assessment at the same time gradually building up malaria detection procedures so as to cover the whole population by the third year when malariometric surveys will probably have reached their limit of usefulness.

Cessation of spraying

In the advanced stages of a malaria eradication programme the problem of when to stop

¹ Yekutieli P. (1960) *Bull. World Health Org.* 22, 669.
² *World Health Org. Tech. Rep. S.* 1959, 162, 5.

spraying arises. In this connexion the seventh report of the WHO Expert Committee on Malaria specifies two criteria: "(a) interruption of transmission and (b) reduction of the number of cases to zero or at least to a level so low that endemicity cannot readily be re-established".² In the opinion of the Committee the reservoir of infection may be said to be practically depleted when no cases can be found in a reasonably intensive search.

The difficulty about these criteria is that they give no quantitative measurements for guidance. In a few places "reduction of the number of cases to zero" was taken literally and spraying was unnecessarily prolonged. In a number of others the decision to discontinue spraying was taken when malariometric sample surveys gave parasite rates of 1 or 2%; this proved premature and serious breakdowns occurred when the consolidation phase was already assumed to be established.

The level of incidence which would safely permit the decision to discontinue spraying must therefore be established. Experience has shown that in areas where consolidation has successfully been maintained when spraying has ceased the annual incidence rates per 1000 population have invariably been less than 0.5. Care must be taken in drawing conclusions from general rates and the correctness of incidence figures should be confirmed by detailed field investigations.

Another factor to be taken into account before discontinuing spraying is the danger of reintroduction of infection by migrant groups. In regions where there are movements of population it is advisable to continue spraying in areas considered as satisfactorily treated until the same position has been reached in neighbouring areas.

Stability of the consolidation phase

It will be clear from the foregoing that the situation in a consolidation phase area cannot be considered satisfactory unless the annual malaria incidence is 0.5 per 1000 at the most. A higher figure often indicates the

persistence of residual transmission and means a greater number of cases than can be handled efficiently and rapidly enough to prevent the renewal of transmission in the absence of spraying.³ In the consolidation phase investigation and radical treatment of every case are an integral part of the surveillance operations. If the number of cases is unduly large these operations will break down.

Moreover an annual incidence of 0.5 is permissible only at the beginning of the consolidation phase. Proper surveillance should reduce it steadily over a period of two or three years until total eradication is achieved.

Scope of case detection

Malariologists are in agreement that the number of blood slides examined in one year should represent a figure in the neighbourhood of 10% of the population if case detection is to be satisfactory. Information based on smaller proportions of slides per population has proved unreliable in practice. In the majority of projects the general annual fever rates have been between 10% and 20% though the proportion of slides positive for malaria rarely exceeds 1% in the later stages of the attack phase. From the qualitative point of view total coverage is essential: blood slides as well as general information must be received several times a year from all localities in the area of operations.

Asymptomatic carriers

In the later stages of an eradication programme asymptomatic infections may be a cause of persistent residual malaria foci which are extremely difficult to find and treat particularly as case finding is based chiefly on the symptom of fever. In certain endemic or hyperendemic areas where eradication had not been started it was found that 83-94% of infections were symptomless at the time of blood examination. In countries at various stages of eradication the proportion of infections without symptoms has ranged from 91% (Taiwan) to zero (Palma de Monte chiaro Sicily). In those where malaria was

recently hyperendemic and where there still exists some residual transmission the proportion of asymptomatic infections is comparatively high in those where some time has passed since the interruption of transmission it is low. This suggests that some degree of persistence of the clinical tolerance originally acquired under hyperendemic conditions is the chief factor in the occurrence of asymptomatic infections.

From the practical point of view the existence of a high proportion of asymptomatic cases in certain circumstances and phases of the eradication programme may warrant the use of different detection methods such as mass blood surveys. In general it should be possible to discover a large proportion of the asymptomatic infections by examining blood slides from all contacts of positive cases revealed in fever surveys.

Other epidemiological factors

Another factor influencing the epidemiology of disappearing malaria is the changing

age distribution of cases. In an untreated or only partially treated area children are most affected but where transmission has been greatly reduced 50-90% of cases are in persons over the age of 15. As they stay at home more and travel less than adults small children are better protected by residual spraying; infant parasite rates are therefore unreliable as indicators of the interruption of transmission and case detection should be carried out as intensively among adults as among children.

One of the main problems in the later phases of malaria eradication is the elucidation of causes of residual transmission. Once causes related to inefficient operations—either spraying or case detection—or causes related to social factors like migration have been excluded a very important task is the clarification of possible entomological factors: the existence of an exophilic secondary vector not previously recognized; development of behaviouristic avoidance by the vector; and changes in the vector's biting and resting habits.

CLASSIFICATION OF BRUCELLA

The increasing interest which public health authorities have shown in brucellosis during the last 25 years has encouraged research on the bacteria responsible for the disease. The controversial subject of *Brucella* classification has often been discussed in articles appearing in the WHO Bulletin as well as in the reports of the WHO Expert Committee on Brucellosis.

As early as 1928 Huddleson proposed biochemical criteria for dividing *Brucella* into three species (*Br. abortus*, *Br. melitensis* and *Br. suis*). These criteria were based on variations in the resistance of *Brucella* to the bacteriostatic action of dyes added to an agar medium (thionine and basic fuchsin) and on its ability to decompose an organic sulfur compound into measurable amounts of hydrogen sulfide. Later on serological

criteria—typing by means of monospecific sera—were added. More recently phage typing has been suggested as a further means of differentiation.

Most of the workers engaged in the systematic typing of hundreds of strains from all over the world using biochemical and serological criteria have encountered atypical strains that could not be classified. Huddleson et al. found 13 such strains among 2515 they studied between 1928 and 1942. Certain variants were found in regions very far apart. The variation in resistance to bacteriostatics noted by Wilson in 13 atypical strains isolated from infected animals and human beings in different parts of Europe was later found in strains isolated in the United States and in Switzerland. Variations observed in France were found to be similar to those discovered

in strains from cows in India and buffaloes in Java

Several strains isolated in France had the characteristic biochemical properties of *Br melitensis* but behaved serologically like *Br abortus*. On the other hand strains isolated in England corresponded to *Br abortus* as regards biochemical properties but reacted like *Br melitensis* with monospecific sera.

Although the atypical strains are relatively few in number their existence cannot be ignored. Moreover differences in enzymatic and antigenic activity found within the classical species have given rise to the hypothesis that mutations occur. Characteristics have been known in fact to change under natural conditions (i.e. in the host). Is this due to induced mutation or to the selection of already existing mutants? There is doubt on this point and extreme views have been put forward by some research workers—Renoux in particular—who believe that there is only one *Brucella* species and that the biochemical and biological differences between the strains are merely quantitative differences between varieties of one and the same species.¹ If laboratory procedures could be used to change for example all the characteristics of several strains of *Br abortus* or *Br suis* so that they could no longer be differentiated from *Br melitensis* or vice versa then it would be justifiable to maintain that all *Brucella* strains were only varieties of a single species.

The WHO Bulletin will shortly publish results of investigations by I. F. Huddleson into the following questions: Can the characteristics so far used to identify the three *Brucella* species be changed by laboratory methods other than laboratory inoculation? If so do these changes justify the conclusion that mutations occur causing the transformation of one *Brucella* species into another?

The experiments which are described in detail led to the appearance of variants which differed from the original strain only as regards the enzyme system governing the production of hydrogen sulphide. These variants seemed to be stable. Their properties were

similar to those of atypical strains isolated from infected human beings and animals. Discussing his results the author points out that the origin of the variants remains uncertain. Possibly small numbers of mutant cells existed in the parent strain but the experiments do not exclude the possibility that the change was induced by the bacteriostatic dye.

Can such changes be referred to as mutations since none of the other typical characteristics of the species have altered? Certainly none of the results of this study confirms the hypothesis of a transformation of one species of *Brucella* into another.

The author stresses the importance of watching for any new strains wherever they may appear and examining their characteristics to determine whether any migration of *Brucella* species from one region to another occurs through infected hosts or any other means. It is also important to track down variants and determine their area of distribution and their frequency in a given region. The author feels that it would be illogical at present to discard the methods now used for classifying newly isolated strains—even if discrepancies in one or other of the differential tests are encountered from time to time—until more reliable methods have been developed.

In a forthcoming issue of the WHO Bulletin there will be a note by E. Sacquet and G. Renoux on an important aspect of the technique of cultivation on thionine medium. The experiments reported in the note showed that thionine gradually loses its bacteriostatic power for *Br abortus*. It is roughly estimated that a Petri dish containing 1/80000 of thionine and used six days after preparation has a bacteriostatic activity close to that of a freshly prepared dish containing 1/160000 of thionine. The fall in the inhibiting power of thionine which takes place at an unpredictable rate may be responsible for certain atypical reactions of *Brucella* strains. It thus appears necessary for the bacteriostatic media used in identification techniques to be freshly prepared and reports and publications on the subject should clearly indicate that this has been done.

ORIGIN OF DIARRHOEAL INFECTIONS

To detect the origin of an epidemic of diarrhoea in a group of people needs at times the astuteness and ingenuity of a detective. It means that every dietetic clue must be followed up, every link in the chain reconstructed until the chain is complete and the person primarily responsible for the infection discovered. It is by no means easy to pin down the responsibility in every case.

Dr Joan Taylor in a general study of the diarrhoeal diseases in Great Britain to be published shortly in the *Bulletin of the World Health Organization*¹ describes several of the complicated cases that have occurred. There is nothing surprising about their complexity given the variety of sources of *Salmonella* infection: animals living and dead, meat products, fish products, eggs, milk, animal foodstuffs, fertilizers, etc. The table opposite gives some idea of this variety. In general, the serotypes of *Salmonella* most commonly found in man are those most widely spread among foodstuffs and among animals and their feeding stuffs. The concept of a vehicle of infection has been greatly expanded in recent years to include not only organic products liable to infection and the seasoning used for them but the apparatus and machines through which they pass while being prepared for the market, the air of the premises in which they are kept and the people who handle them.

Dr Taylor mentions the case of the simultaneous outbreak of attacks of diarrhoea in several Edinburgh districts: the origin of the infection apparently being in a city bakery and restaurant. The ingredients used for the cakes on which suspicion was focused (egg albumen, cream, etc.) were examined by the health services and found to be free of *Salmonella*. Only on a closer examination was it observed that owing to superficial washing a deposit of dried egg albumen still adhered to the metal edges of a mixer. This albumen contained *Salmonella* and had con-

taminated the mixer which was later used for other preparations. The origin of the *Salmonella* that had infected this deposit was never discovered but with the removal of the deposit attacks ceased. In the same year other mysterious cases of *Salmonella* infection occurred. Little by little they were traced back to the milk of a sick cow that had not only infected the farm workers but also through the milking machine contaminated the milk of healthy cows distributed for consumption. Some of these infections which were due to *S. thompson* were serious and the patients had to be admitted to hospital. Several patients although cured continued to excrete *Salmonella* up to 11 weeks after the onset of the illness. Other cases cited by the author are of fish infected on landing by the sewage-contaminated water with which they were washed and of human infection with *S. enteritidis* of unknown etiology. Several serotypes have been isolated in the pig but we do not know how they pass from the living animal to man or what the intermediate stage is.

Salmonella are transmitted from one country to another by commercial products particularly protein foods and fertilizers. *S. typhimurium*, the serotype responsible for 75-80% of *Salmonella* infections in England and Wales, has been found in egg products from England, Australia, China, USA and the Netherlands. The processing of eggs for commercial food products—the breaking of the shell which introduces the organisms on the surface, drying and conversion to powder—increases the risks of contamination. The processing of meat is open to the same risks. All that is needed to spread infection far and wide is one infected carcase in a slaughterhouse or the inclusion in food stuffs for cattle of infected substances unfit for human consumption (which will transfer the infection to the milk and thence to a community). Long delay before slaughter favours multiplication of the germs in the living animals and greater contamination of the carcase. The importation in some years of

Taylor J. (1960) *B. W. H. O. g.* 23 (In press)
Wright H. A. et al. (1957) *B. J. M. D.* 2, 69

COMPARISON OF SALMONELLA ISOLATIONS FROM HUMAN SOURCES WITH ISOLATIONS FROM ANIMALS AND OTHER MATERIAL IN ENGLAND AND WALES 1958

S. monel typ	H. m.	A. mal	Prod. ts		
			H. m. food	Eggs & egg prod. cts	A. m. f. food & f. r. l.
S. m. anat. m.	5	Pgs Dog 35	English b. f. 4	F. g. egg prod. cts 8	F. h. m. l. 2 M. t. m. l. 1 B. m. l. 15 A. l. & b. o. e. m. l. 1 Pg. st. r. t. m. h. o. r. m. l. 1 Hoof & h. o. o. f. m. l. 1 l. d. h. e. d. b. e. 5 F. r. t. l. 1
S. m. ber. y.	50	Pgs B. e. 3			F. h. m. l. 2 M. t. m. l. 1 B. m. l. 4 l. d. c. h. e. d. b. e. 1
S. m. d. by.	5	Pg Ch. k. 1 Dog 1	Sa. sag. m. t. 1	Engl. h. gg. p. d. ct. 1	Ch. k. m. l. 1 M. t. m. l. 1 Hoof & h. f. r. l. 1 Hoof & h. o. o. f. m. l. 5 l. d. r. u. h. d. b. e. 1 F. r. t. l. 1
S. m. t. d.	79	Pg 1			M. t. m. l. 1
a. d. y.	1	Pg 1			
va. se.	1				F. h. meal 1
va. l. a.	32	Pg B. l. e. 2			l. d. h. d. b. e. 2
S. m. head. be. g.	308	Pg Don. 2	S. g. m. t. 2	F. g. gg. p. d. cts 1	l. d. r. u. h. d. b. 1
S. m. ewport.	118	Pg Dog 2	A. tral. b. f. 1 N. w. Z. l. d. m. u. t. t. 1	F. g. egg prod. ct. 12	B. m. l. 10 l. d. h. d. b. e. 3 F. r. t. l. 1 C. h. d. b. 1
S. m. th. mp.	13	Pg C. Dog 6		F. g. egg p. d. t. 227 Engl. h. gg. p. d. t. 4	H. g. h. e. Gyl. / p. l. l. t. 1
S. m. typh. m.	3097	Pg B. 16 Ch. k. 10 Dog 6 Sh. p. 1 T. k. y. 1	S. g. d. 3 P. k. p. k. l. h. e. o. 2 P. g. k. u. d. / 1 Cock. 1 A. tral. b. o. l. 1 b. f. 1 N. w. Z. l. d. b. o. l. 3 m. t. t. 3 New. Z. l. d. f. e. 5	F. g. gg. p. d. t. 143 Engl. h. gg. p. d. t. 72 M. p. d. t. 19	B. m. l. 9 M. t. & b. m. l. 1 Hoof & h. f. r. l. 1 Hoof & h. o. o. f. m. l. 3 l. d. r. u. h. d. b. 4 F. r. t. l. 1

Part I rep. d. t. f. t. bl. m. p. y. g. D. T. y. l. r. r. t. l.

goods infected with *Salmonella* led to cases occurring in England. In 1947 on the basis of the cases due to these imported types the serotypes of *Salmonella* were classified into native and exogenous or imported. This distinction is no longer clear cut many serotypes existing concurrently.

The epidemiology of *E. coli* and *Shigella* infections is very different from that of *Salmonella*. Serotypes of *E. coli* pathogenic to man are rarely found in animals and vice versa. Infection is direct from child to child or through the environment (objects or dust). It has been shown that a case of *E. coli* diarrhoea infects the immediate surroundings in 18 hours. As for *Shigella* infections they seem to be transmitted from one person to another. The pathogenic organism can survive for several days in contaminated premises.

In her very full study Dr Taylor touches upon the question of host susceptibility the

human factor which together with the other etiological factors determines the incidence and the seriousness of the infection. *Salmonella*, *Shigella* and *E. coli* are found in perfectly healthy people. Debilitating conditions increase the risks of clinical infection. A cold, pneumonia, diabetes favour an attack of *E. coli* infection in children. *Salmonella* diarrhoea from an unnoticed or neglected infection in the mother on the day of the delivery may be fatal to a newborn infant. *Salmonella* meningitis may affect a premature infant. Pregnant women and animals are extremely susceptible to *Salmonella* infections. In none of these cases has the infection anything to do with food poisoning. It is difficult to assess individual resistance but age, pregnancy and debilitating conditions appear to be important factors in the production of clinical disease due to enteropathogenic organisms.

Health needs of the Congo

It will be recalled that as soon as the emergency developed in the Republic of the Congo (capital Léopoldville) WHO sent a mission to help organize the country's health services. A report from the WHO Senior Representative in the Congo describes the health situation there in mid September. Medical care services appear to have suffered less than preventive services from shortage of medical personnel. It is important to consolidate the preventive services as quickly as possible so that the gains made in this field in recent years—particularly where insect borne diseases are concerned—will not be lost. The French Government has made available four mobile health teams, each consisting of a doctor and a technician for preventive work.

Many reports of small localized outbreaks of smallpox continue to be received. The medical census teams whose original task was to survey the health situation as a whole have been asked by WHO to organize a vaccination service. The Government of Nigeria has donated 8 000 000 doses of freeze-dried smallpox vaccine.

In most areas the routine treatment of leprosy cases is being continued by Congolese staff. However it is reported that in some areas leprosy cases are leaving institutions because of food shortages and returning to their villages. There are also reports that mosquito breeding has increased substantially and the number of cases of malaria is growing.

Hospital services are being utilized to a greater degree and the number of beds occupied at the main hospitals has increased. The national Red Cross teams continue to give extremely valuable service in the provincial and district hospitals although some of them are working under great difficulties.

Intensive training courses for Congolese staff operating water purification plants have been started with help from WHO and bilateral assistance personnel. Attempts are being made to improve the distribution of medical supplies from Leopoldville to provincial and district centres and supplementary despatches are being made by United Nations transport.

As a first step towards a long term programme for recruitment of health personnel from abroad—until Congolese doctors can take over—WHO is helping to provide the Congo Government with the most essential staff for the basic medical services. Plans for intensifying the training of Congolese medical students are well advanced and a scheme is being established whereby a substantial number of Congolese "assistants médicaux" will be able to take courses overseas in order to qualify as doctors of medicine.

Rabies control *

The fourth report of the WHO Expert Committee on Rabies¹ has been prepared as a self-contained document thus minimizing the need to refer to previous reports. Careful re appraisal and modification of recommendations made in the third report² have been necessitated by the considerable body of new knowledge acquired as a result of research efforts during recent years.

Dealing with the prevention of rabies in man the Committee points out that additional field experience has confirmed the effectiveness of combined serum and vaccine treatment of human beings who have been severely exposed to rabies infection and emphasizes that this is definitely the best method now available.

The phenomenon of interference with the antibody response to vaccine by antirabies serum has been further demonstrated and possible means of avoiding it have been developed. In view of these findings slight revisions have been made in the Guide for Post Exposure Treatment.

The development of an inactivated virus avian embryo vaccine (duck embryo) shown in experimental work to contain only minimal amounts of the factor or factors responsible for allergic encephalitis as compared with nervous tissue vaccines similarly tested should help to reduce post vaccinal nervous system reactions.

Rabies prophylaxis in man has long been a problem when it involves particular groups of persons with unusual risks of repeated

exposure for instance veterinarians field naturalists or laboratory workers. For them repeated exposure means repeated treatment thus increasing the possibility of severe reactions to the vaccine especially central nervous system reactions. There are now two types of vaccine available which are almost devoid of encephalitogenic properties and a schedule of immunization with these is suggested by the Committee.

The most recent advance in the diagnosis of rabies has been the development of the fluorescent antibody technique which when properly used can establish a highly specific diagnosis of test specimens within a few hours.

The Committee emphasizes the importance of prophylactic vaccination of dogs in the control of rabies. Immunity for at least three years can be conferred by a single injection of LEP Flury chicken-embryo vaccine. Recommendations are made on vaccination dosages for dogs cats and cattle and other control measures relating to stray dogs domestic pets bitten by rabid animals the international transfer of dogs and cats and wild life rabies are discussed.

Vampire bat rabies continues to be a health problem in Latin America and increasing numbers of rabies virus isolations are being reported from insectivorous and frugivorous bats in North America and south eastern Europe. The Committee strongly warns against handling bats which appear to be sick or to be behaving strangely and recommends that persons bitten by bats in known infected areas should receive anti rabies treatment.

Among other recent advances in rabies dealt with by the Committee are the availability of a new batch of international reference vaccine the establishment of an international standard serum and improvement of methods of production and concentration of antibody.

WHO Expert Committee on Rabies (1960) Fourteenth Session, Geneva, 28 p. English. Also published in French and Spanish.

Members of the Committee: Dr K. H. Kel USA (President); Dr A. Kermans, Israel; Dr H. Koprowski USA (Secretary); Dr P. Leinfelder, Germany; Dr R. Schuler, Germany; Dr M. Selimov, USSR; Dr N. Veeraraghavan, India (Chairman); Representative of the Food and Agriculture Organization: Dr L. U. Ledwith, India; Dr H. K. Ishii, Japan; Dr M. Abdou, WHO; Dr G. B. Lengua, WHO; Dr W. M. K. Lin, WHO (Secretary); Dr O. R. Berg, Sweden (Consultant); Dr E. S. Tjorkel, USA (Consultant).

WHO Bull. Org. A. R. P. Ser. 1957. 121

Notes and News

Regional Committee for Africa

The WHO Regional Committee for Africa held its tenth session in Accra Ghana from 8 to 13 August 1960 under the chairmanship of Dr P M J Phillips (Ghana) Dr G V Kprotso (Togo) was elected Vice Chairman the Rapporteurs were Dr O B Alakija (Nigeria) and Dr A S P Tchoungui (Cameroon)

The session was attended by representatives of 30 countries most of them newly independent or emerging states which had recently acquired or were about to acquire WHO membership A special resolution was voted to enable certain of these countries which have become fully independent since the last World Health Assembly (May 1960) to retain their privileges as Associate Members

In his report covering WHO work in the African Region since July 1959 Dr F J C Cambournac Regional Director said that owing to the rapid achievement of independence by many African countries WHO was having to deal with an increasing number of requests Fortunately a supplementary budget of \$200 000—out of which \$160 000 was to be devoted to Africa—had been adopted by the last World Health Assembly to help newly independent states meet some of their most pressing needs Dr Cambournac stressed that all progress in health should be accompanied by equal social and economic progress so that it might be possible to cope with the problem of overpopulation and prevent undernourishment and malnutrition

On the subject of communicable diseases Dr Cambournac said that optimum conditions for malaria and other diseases such as human and animal trypanosomiasis bilharziasis and onchocerciasis still existed in Africa Malaria was the most important disease in the Region affecting almost its entire area with the exception of Basutoland Nevertheless in spite of difficult conditions in most parts of the continent trans-

mission of the disease had already been completely interrupted in some places particularly in the forest areas of Cameroun and Liberia as a result of vigorous and carefully planned campaigns carried out with WHO and UNICEF assistance Remarkable progress had been noted in Zanzibar Pemba and Mauritius where the last phase of surveillance had been reached A pre-eradication campaign had been started in the south-eastern part of the continent and would cover some 5 million people

The fight against yaws and leprosy had reached an advanced stage and in some areas once seriously infected by yaws the disease was no longer a public health problem This applied particularly to Nigeria which included most of the 10 million people cured out of the total 20 million in the whole of Africa known to be affected a few years ago Of the estimated 2 300 000 leprosy patients in Africa over a million were under treatment

The Committee endorsed the proposed programme and budget for 1962 which called for an expenditure of \$1 773 000 under the regular budget of WHO \$2 594 000 from the Malaria Eradication Special Account \$851 000 from United Nations Technical Assistance funds and \$11 000 in other extra budgetary funds The staff assigned by WHO to the African Region in 1961 will be 283 in number and an increase to 313 is foreseen for 1962 The number of projects will rise from 261 in 1961 to 287 in 1962 if all requests can be complied with

The technical discussions at the session were on problems of environmental sanitation in Africa The main points discussed were water supplies waste and sewage disposal and training of sanitation staff From the statements made by most participants it appears that the sanitary situation is becoming very serious in many fast growing African towns However the rural communities should not be forgotten when national plans are drawn up to provide adequate water supplies and sewage disposal facilities A

primary difficulty in connexion with water supplies is that of finding the necessary funds. Qualified personnel are also needed for the proper maintenance of existing installations. A water supply system should in the long run pay back the money spent so that the capital can be used for building other water supply systems in the country concerned. Some villagers still have to walk over five miles to get water which is polluted and brings disease. More sanitary engineers, sanitary inspectors and other allied personnel have to be trained to give advice to communities and enable them to devise simple and cheap means of improving their environment. The importance of health education was particularly stressed by all participants for it is not worth launching any projects unless they have the support of the population nor—to quote one participant—building latrines if the people do not know how to use them.

The next session of the WHO Regional Committee for Africa will take place in Brazzaville, Republic of the Congo, in 1961.

Regional Committee for the Americas

The Directing Council of the Pan American Health Organization, which is also the WHO Regional Committee for the Americas, held its twelfth meeting (twelfth session of the Regional Committee) from 14 to 16 August 1960 at Havana, Cuba.

Representatives of 17 American Republics and of France, the Netherlands and the United Kingdom took part in the session. Observers from Canada, the Organization of American States, UNICEF, UNESCO and from various non-governmental organizations and other institutions were also present.

The Council elected Dr Jose R. Machado Ventura, Minister of Public Health of Cuba, as Chairman and Dr H. van Zile Hyde (USA) and Dr Lisandro Latuf (Venezuela) as Vice Chairmen.

The programme of work for 1961 approved by the Directing Council comprises 254 projects to be carried out with the collaboration of the Pan American Sanitary Bureau (PASB) which

acts as the WHO Regional Office for the Americas. The Pan American Health Organization's regular budget for 1961 amounts to \$4 800 000 which represents an increase of \$700 000 over that of 1960. In addition to its regular budget the Pan American Health Organization also has available for its work the sums allocated in the WHO regular budget to the Region of the Americas (\$1 891 500 for 1961) as well as the Technical Assistance funds administered by WHO for programmes in the same Region (\$981 400) and other funds for specific purposes (malaria eradication, community water supplies, the Institute of Nutrition of Central America and Panama, the Technical Co-operation Programme of the Organization of American States and special subsidies) amounting to approximately \$4 573 800. The total funds available for 1961 thus come to about \$12 746 700.

The Council noted the proposed programme and budget for 1967 providing for the use of \$5 740 000 from the PAHO regular budget. With the addition of the other funds administered by PAHO, the general total of the 1967 budget is about \$12 994 700.

Presenting his annual report, Dr Abraham Horwitz, Director of PASB and WHO Regional Director for the Americas, stated that during 1959 the Regional Office had particularly stressed the inter-relationship of health, welfare and economy. This question had already been raised by Dr Horwitz at the second meeting of the Special Committee for the Establishment of New Methods of Economic Co-operation (Committee of Twenty-one) of the Organization of American States, held in April 1959 at Buenos Aires, which recommended to governments that, in planning and negotiating the financing of economic development, public health programmes should be included, as these are essential and complementary to economic programmes. The Committee of Twenty-one also recommended that governments should obtain the technical advice of PASB in drawing up such programmes. The Council decided to request the Director of PASB to consult with the appropriate officers of the Organization of American States and of other organizations interested in or connected with public health, in order to study how the joint interests of these organizations in the economic field could be further developed.

On the subject of the economic aspects of malaria eradication the Council decided (a) to suggest to the Member Governments that in their respective economic plans recognition be given to the importance of the eradication of malaria in their territories and its significance for improvement in the standard of living especially that of rural people who live in areas having a high incidence of this disease (b) to request the Pan American Sanitary Bureau to study in so far as budgetary limitations permit the possibility of devising methods for the evaluation by the Member Governments of the economic and social significance implicit in the speedy elimination of malaria (c) to recommend that the Member Governments consider the possibility of extending such evaluation services to include all the programmes conducted by their respective public health administrations

In view of the interest aroused by the question of the relationship between health and economy it was agreed to select Methods of evaluation of the contribution of health programmes to economic development as the topic for the technical discussions to be held during the next meeting of the Director's Council

The subject of this year's technical discussions—to which one day of the meeting was devoted—was Technical administrative legal and financial aspects of garbage and refuse disposal

On the basis of a report submitted by the Republic of El Salvador the territory of that country was declared to be free from *Aedes aegypti*. The representative of Colombia stated that his country hoped to submit a similar report at the next session. It was recommended that *A. aegypti* eradication campaigns be undertaken in countries which are still infested and that those already in progress be intensified. Countries in which the vector of urban yellow fever has already been eradicated were reminded of the necessity for maintaining strict vigilance in sea air and land ports in order to prevent reinfestation.

With regard to malaria eradication the Council expressed satisfaction with the measures taken by the various governments and by the Pan American Sanitary Bureau to solve the epidemiological and entomological problems encountered in the course of the campaign. It reaffirmed its interest in the programme and

also requested Member Governments to continue their efforts to complete the eradication campaign in their respective territories and thereby contribute towards the attainment of the goal of world wide eradication.

On the question of smallpox eradication, the Council expressed the view that although this disease has already disappeared from a number of countries of the Americas and is being eliminated in others by intensive vaccination programmes there are still some countries in which the disease persists and where no such programmes have been undertaken. As this situation represents a serious public health problem for the Americas as a whole the Council recommended that governments take the necessary steps to bring about total eradication of the disease.

At one of the meetings the Director of PASB submitted a volume containing all the scientific papers presented at the Second International Conference on Live Poliovirus Vaccines together with the summary records of the proceedings of the Conference held two months previously—from 6 to 12 June—in Washington.

Resolutions were also passed on the following subjects: collaboration of PASB with national health services in connexion with administrative practices; the status of community water supply programmes; advertising of medical products; educational needs for health personnel in the Americas; secondment of staff from Member Governments; general programme of work of PAHO/WHO covering the period 1967-1968.

With regard to the problem of malnutrition, particularly in children the Council discussed the development and utilization of INCAPARINA—a product prepared by the Institute of Nutrition of Central America and Panama. This is an inexpensive vegetable mixture of high nutritional value intended to prevent protein malnutrition in economically underdeveloped nations. It was recommended that Member Governments study carefully the potential value and the possibilities of producing

INCAPARINA or similar local products and means of promoting their consumption. It is in fact possible to obtain similar mixtures equally rich in vegetable proteins by adapting production to the raw materials available in the various countries and to the people's dietetic habits.

Argentina and Chile were elected to the Executive Committee to replace Mexico and Venezuela whose terms of office had expired. The Committee also includes representatives of Brazil, Colombia, El Salvador, Honduras and the United States.

During the meeting the United States representative announced that Congress had approved the allocation of a sum of \$875 000 for the acquisition of land to be donated by his Government for a new headquarters building of the Pan American Health Organization in Washington D.C. The Council expressed its gratitude to the United States Government and authorized the Director of PASB to accept the gift. The new building is expected to cost about \$4 555 000.

Regional Committee for South East Asia

The thirteenth session of the WHO Regional Committee for South East Asia was held in Bandung, Indonesia, from 22 to 29 August 1960. It was attended by representatives of nine countries and of the United Nations Technical Assistance Board, UNICEF, FAO and a number of non-governmental organizations. Dr Saiful Anwar (Indonesia) was appointed Chairman and Dr Kamdhorn Suvarnakich (Thailand) Vice Chairman.

Dr C. Mani, WHO Regional Director for South East Asia, stated in his report for the period August 1959 to June 1960 that the burden of sickness in the Region was very heavy indeed. Malnutrition and poor sanitation, both due to poverty, were the main causes of this deplorable state of public health in South East Asia.

While governments in the Region are making strong efforts to reduce poverty through various degrees of industrialization, the sinister role of malnutrition and sanitation on the health and working capacity of the people is still not properly appreciated.

The loss of working time is really staggering, and until government planning bodies realize this and are willing to give top priority to the improvement of these two vital conditions, this colossal drain on national economies will continue and grow steadily through the coming years of rapid industrial development.

During the period under review WHO helped governments in the Region with 129 projects employing 238 WHO field workers. These projects were as in previous years mainly concerned with the control of communicable diseases, the promotion of rural health services and the training of all categories of health staff.

Malaria eradication programmes had made progress despite difficulties (mainly financial), adequate national staff, better training and stronger supervision at all levels were still needed. A countrywide national tuberculosis control programme was being established in India with WHO help and a pilot project had been started in Thailand as a preliminary to the expansion of tuberculosis services throughout the country. As a first step towards launching national smallpox campaigns, pilot projects had been started by governments in Afghanistan, India and Indonesia and it was hoped that these would give answers to the technical and administrative problems involved in organizing mass campaigns in South East Asia.

Assistance in the development of epidemiological units had proved valuable in Ceylon and Indonesia and was to be extended to other countries in the Region. The development of rural health services had been rather slow, owing mainly to shortage of staff, unsatisfactory training and inadequate supervision, which often reduced health centres to the level of mere dispensaries. As the rural health centres developed, the need for public health laboratories was becoming more pronounced and it was hoped to increase WHO help in this field.

In maternal and child health, WHO and UNICEF continued to help through urban and rural health centres and by developing the teaching of paediatrics and obstetrics. WHO help in environmental sanitation had been concentrated as before on the education and training of sanitary engineers and sanitarians and on the environmental sanitation aspects of rural health programmes. A survey had been undertaken for a sanitation project in the Greater Calcutta area, and the Regional Office was examining ways and means of helping governments with the provision of community water supplies.

A Regional Adviser in Nutrition had been appointed and ways in which WHO might help

governments with their nutrition work were being reviewed. Assistance to medical education by the provision of visiting professors and the award of fellowships had continued.

The programme and budget estimates for 1962 were endorsed by the Committee. They provided for the utilization of approximately \$7 500 000 made up as follows: \$1 998 000 from the regular WHO budget, \$885 000 from the Malaria Eradication Special Account, \$1 195 000 from United Nations Technical Assistance funds and \$3 408 000 from other extra budgetary funds.

The Regional Director was asked by the Committee to urge governments to develop health programmes for children of school and pre-school age and to that end to establish closer co-operation between their Ministries of Health and Education.

The Committee also advocated pilot studies on the control of the enteric group of diseases, the possibility of eradicating filariasis and the effect of malaria eradication programmes on the filariasis problem.

The use of liquid BCG vaccine raises serious problems in a tropical climate and it was therefore urged that the WHO study on the use of freeze-dried BCG vaccine be completed as quickly as possible. The Regional Director was asked to see how governments might obtain freeze-dried vaccine at a reasonable cost should it be considered suitable.

On the subject of malaria eradication the Committee noted the financial and organizational difficulties that had prevented some countries from keeping to their programme schedules. As it was highly desirable for neighbouring countries to achieve eradication at about the same time, Member Governments were urged to take effective steps to provide sufficient funds in time to permit the completion of their programmes with the necessary speed and efficiency. The Regional Director was asked to provide an up-to-date statement on insecticide resistance in different parts of the world.

The technical discussions at the session had as their subject *The evaluation of training programmes for auxiliary personnel in the South East Asia Region*. The points discussed included the broad categories of auxiliaries required for health services, the nature, scope and content of training programmes and the

need for periodic formal and informal refresher courses for teachers and supervisors as well as the auxiliary workers themselves. Considerable attention was given to such problems as the exercise of effective supervision opportunities for advancement and the appraisal of auxiliaries at work. The subject selected for the 1961 technical discussions is *The role of the public health department in the improvement of nutrition*.

The fourteenth session of the Regional Committee for South East Asia will be held in Ootacamund, South India, in September 1961.

Regional Committee for Europe

The WHO Regional Committee for Europe held its tenth session at Copenhagen, Denmark, from 16 to 20 August 1960. It was attended by representatives of 27 Member States and of a number of governmental and non-governmental international organizations. The session was opened in the presence of His Majesty Frederik IX, King of Denmark, by Dr V. Manulescu (Romania), the outgoing Chairman.

The Committee elected the following officers: Dr J. Frandsen (Denmark), Chairman; Dr A. Sauter (Switzerland) and Dr L. Molitor (Luxembourg), Vice Chairmen; Dr M. Juchniewicz (Poland), Rapporteur; Professor E. Aujaleu (France), presided over the technical discussions.

In his report for the period July 1959-June 1960, Dr Paul J. J. van de Calseyde, WHO Regional Director for Europe, stated that a special attempt was being made to establish a balance between country and inter-country programmes and between old and new programmes. Two new services had been started at the Regional Office: one for chronic diseases and geriatrics and the other for epidemiology and health statistics. The latter service is taking part in studies of chronic diseases such as hypertension, cardiovascular diseases, cancer and tuberculosis.

The education and training programme continued to be the principal WHO activity in the Region. Study tours had been organized in Bulgaria, Czechoslovakia, France and the USSR on such subjects as health administration, rural health services and industrial medicine. The

Regional Office had also sponsored 4 international courses on a series of technical problems including the administration of medical services, safe water supplies and veterinary public health. There had been 530 fellowship awards during the year.

With more and more factories being started and a growing number of cars on the roads, air pollution is an increasing problem in most European towns. There can be scarcely any doubt that it is one of the main factors responsible for the growing incidence of chronic bronchitis and lung cancer, which is particularly marked in the most heavily polluted areas. The Regional Office has undertaken a study programme aiming at the standardization of instruments for measuring air pollution and methods for analysing it, as well as the establishment of international standards for maximum permissible levels of pollution, the preparation of legislation on the subject and techniques for controlling the discharge of contaminants.

The Committee recommended that all European countries where malaria still exists should make an effort to reach the consolidation phase of the eradication programmes by 1962. Those which have had no cases of indigenous malaria for three years should ask WHO to send an evaluation team to establish the zones where eradication has been achieved. All countries of the Region were asked to make suitable contributions to the Malaria Eradication Special Account. The Regional Director was asked to continue his efforts for better comparability of tuberculosis statistics in Europe.

Two disasters had occurred during the year in Morocco, which is included in the European Region of WHO: the poisoning of 10,000 persons (mostly in the Meknes area) by contaminated cooking oil and the earthquake at Agadir. In the case of Meknes, the Regional Director stated that WHO had sent experts to investigate the causes of the disaster and had co-operated with the League of Red Cross Societies in the care of the victims, supplying staff to help set up rehabilitation centres, give treatment and train Moroccan physiotherapists. At Agadir, the Organization provided the services of a sanitary engineer and an epidemiological expert.

During the session, the use of Russian as a working language at the Regional Office for

Europe and at the sessions of the Regional Committee was recommended by the Committee. Its introduction would have to be gradual, since the additional funds required were not provided for in the 1961 budget already adopted by the World Health Assembly. The full use of Russian as a working language would not be possible until 1963.

Other topics discussed included radiation protection, rehabilitation, mental health work and co-operation with other organizations. The technical discussions were on the subject of public health as a scientific discipline.

The programme and budget estimates for 1962 provided for the expenditure of \$1,540,600 from the regular WHO budget to which will be added as a table funds from the Expanded Programme of Technical Assistance, the Malaria Eradication Special Account, and other extra-budgetary sources. The Committee endorsed these estimates with certain amendments, notably the addition of a credit of \$33,000 for the introduction of Russian as a working language.

The next session of the Committee will be held in September 1961 at Luxembourg. The Committee accepted the invitation of the Government of the Polish People's Republic to hold its twelfth session at Warsaw in 1962.

Regional Committee for the Western Pacific

The WHO Regional Committee for the Western Pacific held its eleventh session in Manila, Philippines, from 12 to 17 August 1960. The session was attended by representatives of all Member States in the Region, except Cambodia and Laos, and of Member States responsible for territories in the Region. The United Nations, the Technical Assistance Board, the South Pacific Commission, the Rockefeller Foundation, the International Committee of Military Medicine and Pharmacy, and 15 non-governmental organizations in official relations with WHO were also represented. The meeting was attended by Dr P. Dorolle, Deputy Director General of WHO.

The Committee elected the following officers: Dr R. C. K. Lee (USA) Chairman, Dr Yen Yoo

governments with their nutrition work were being reviewed. Assistance to medical education by the provision of visiting professors and the award of fellowships had continued.

The programme and budget estimates for 1962 were endorsed by the Committee. They provided for the utilization of approximately \$7 500 000 made up as follows: \$1 998 000 from the regular WHO budget, \$885 000 from the Malaria Eradication Special Account, \$1 195 000 from United Nations Technical Assistance funds and \$3 408 000 from other extra budgetary funds.

The Regional Director was asked by the Committee to urge governments to develop health programmes for children of school and pre-school age and to that end to establish closer co-operation between their Ministries of Health and Education.

The Committee also advocated pilot studies on the control of the enteric group of diseases, the possibility of eradicating filariasis and the effect of malaria eradication programmes on the filariasis problem.

The use of liquid BCG vaccine raises serious problems in a tropical climate and it was therefore urged that the WHO study on the use of freeze-dried BCG vaccine be completed as quickly as possible. The Regional Director was asked to see how governments might obtain freeze-dried vaccine at a reasonable cost should it be considered suitable.

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The technical discussions at the session had as their subject the evaluation of training programmes for auxiliary personnel in the South-East Asia Region. The points discussed included the broad categories of auxiliaries required for health services, the nature, scope and content of training programmes and the

need for periodic formal and informal refreshers, courses for teachers and supervisors, as well as the auxiliary workers themselves. Considerable attention was given to such problems as the exercise of effective supervision opportunities for advancement, and the appraisal of auxiliaries at work. The subject selected for the 1961 technical discussions is "The role of the public health department in the improvement of nutrition".

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The Committee elected the following officers: Dr J. Frandsen (Denmark), Chairman; Dr A. Sauter (Switzerland) and Dr L. Molitor (Luxembourg), Vice-Chairmen; Dr M. Juchaczewicz (Poland), Rapporteur; Professor E. Ajuvakeu (France), presided over the technical discussions.

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The education and training programme continued to be the principal WHO activity in the Region. Study tours had been organized in Bulgaria, Czechoslovakia, France and the USSR on such subjects as health administration, rural health services and industrial medicine. The

programmes and to ensure that the necessary money personnel and materials are made available. The Regional Director was asked to continue extending and improving regional facilities for training antimalaria staff.

The Committee agreed to recommend to the WHO Executive Board the extension of the term of office of Dr I. C. Fang, Regional Director, for a further period of five years from 1 July 1961 to 30 June 1966.

The subject of the technical discussions held during the session was 'The organization and administration of rural health services'. It was agreed that for the planning and assessment of such services some form of vital and health statistical data should be available. Programmes should take into account resources in money and personnel and local staff should be employed where possible. The rural health unit should provide both preventive and curative services and give priority to important disease problems for which effective control measures are available. It was considered that assessment of the services is essential but that no specific criteria can be laid down for its frequency. It was agreed that in principle it should be done regularly and fairly frequently.

Rural health units could be financed from central government funds, local government funds, or voluntary donations or grants. Their distribution should be based on the size of the population and the area to be served, the general administrative structure and the readiness of the population to accept the health service. It was agreed that each health unit should be headed by a physician and include a nurse, a midwife and a sanitarian. Certain untrained personnel such as herb-doctors might also be used under certain circumstances but there was general reluctance to accept such personnel as regular members of the unit. Midwifery service was considered as a fundamental part of a rural health unit's work and it was agreed that where the necessary facilities are available there should be full-time maternity services. The subject selected for the technical discussions at the Regional Committee's twelfth session is 'Dental health'.

After attending the session representatives of 9 countries and territories took part in a Public Health Conference and Study Tour in Singapore and the Federation of Malaya. During the tour

which lasted from 0 August to 2 September rural health services and field projects were visited and ideas, views and experiences were exchanged with health workers in the host countries.

The twelfth session of the WHO Regional Committee for the Western Pacific will be held in New Zealand in 1961.

Immunization programme for India

About 13.5% of India's 408 million inhabitants are infants and children of 4 and under; about 5% are between 5 and 15 years old. Diphtheria, whooping cough and tetanus cause widespread morbidity and mortality in these age groups. For example, diphtheria—also rife in rural areas—is responsible for between 7000 and 5000 admissions every year to hospitals in cities like Calcutta and Bombay, and no fewer than 84% of the cases are children between 2 and 10 years of age, while 11% are infants. Special studies have shown that tetanus and tetanus of the newborn are important causes of death in rural India. Whooping cough not only causes much suffering, but also many deaths from secondary complications.

In 1959 the twelfth session of the WHO Regional Committee for South East Asia recommended the routine vaccination of children against all three diseases. The major obstacle to this course in India has hitherto been the difficulty of obtaining the necessary vaccines: local production is inadequate and the cost of importing them prohibitive. It has therefore been decided to expand their local manufacture with help from WHO and UNICEF as a preliminary to a countrywide immunization campaign against the three diseases.

A pilot unit for the production of the vaccines will be set up at the Central Research Institute, Kasauli. As soon as the most practical methods of preparation have been worked out, standardized and tested, other laboratories will be encouraged to adopt the approved methods and start production so that the entire needs of the country can be met step by step. At the same time, epidemiological information on the diseases

Fong (Malaya) Vice Chairman Dr O J M Kranendonk (Netherlands) and Dr J P Martins (Portugal) Rapporteurs

The Committee examined the report of Dr I C Fang WHO Regional Director for the Western Pacific for the period 1 July 1959 to 31 May 1960. It noted that encouraging progress had been made in strengthening national health administrations and that more attention had been paid to the need for better co-ordination and careful planning. Work for the development of comprehensive rural health services with maternal and child health as an integral component had continued and there was every indication that these services would expand rapidly in the coming year. Better facilities for the education and training of national personnel of all categories—still a pressing need—were planned. Experience had shown that training within the Region was relatively more economical than training elsewhere and permitted the award of a greater number of fellowships with the funds available. It was also often more useful to the fellows concerned since it was carried out in environments with conditions and problems similar to those in the fellows' home countries.

The year's work in nursing had been encouraging and the need for increasing nursing staff and improving the quality of nursing service was being more generally recognized.

There had been an intensification of anti-malaria work throughout the Region and the concept of eradication was now accepted by most Member States. The results of the mass yaws campaigns and resurveys had been most satisfactory. More countries were planning or expanding tuberculosis control programmes. Smallpox had continued to decline in the countries where it was endemic and the Governments of Cambodia, Korea and Viet Nam were vigorously pursuing mass vaccination campaigns.

In environmental sanitation there had been an encouraging extension in the composting of municipal refuse and night soil to produce hygienic fertilizers.

Joint planning with other agencies concerned with health had been extended and a much closer relationship had been developed between WHO and the South Pacific Commission.

The discussions on the Regional Director's report stressed the importance of studying

countries' socio-economic conditions and potential resources as a basis for planning and establishing long-term health programmes, establishing and developing hospitals and ensuring that their bed capacity is commensurate with the population to be served, developing nutrition programmes. It was observed that inter-country educational programmes had been of great benefit and had had a considerable influence on the development of national programmes. A proposed project to supply piped water to rural and island communities was noted with interest.

The 1962 programme and budget estimates for the Region were endorsed by the Committee. These provide for an expenditure of \$1 764 600 from the regular WHO budget, \$1 014 200 from the Malaria Eradication Special Account, \$751 200 from United Nations Technical Assistance funds and an estimated \$569 000 from other extra-budgetary sources.

The Committee noted that there had been reluctance in some quarters to bring legislation on leprosy control into line with scientific advances. It recognized that health administrations might sometimes be reluctant to adopt policies corresponding to advances in the treatment and control of leprosy because of slowness in convincing the general public as well as professional and political groups of the scientific viewpoint regarding this disease. It recommended that WHO should intensify its public information and educational activities in an endeavour to change age-old attitudes to leprosy and to gain acceptance of modern concepts and suggested that leprosy should be an early subject for a World Health Day.

The Committee considered a report by the Regional Director on the malaria eradication programme in the Region. It noted that regional training activities in this field had been improved by the holding of courses at Tala Rizal, Philippines. It also noted that two trials with medicated salt were taking place in the Region. Owing to the serious financial situation of the malaria eradication operations, Member States—and particularly those with no malaria problem—were asked to contribute generously to the financing of the world-wide malaria eradication programme.

A resolution was adopted urging Member States to give first priority to malaria eradication.

possible reimportation of *Aedes aegypti* following local eradication and the introduction of resistant anophelines into territories where eradication programmes are in progress and where resistance has not yet appeared. In addition the inception of the jet age has not only increased the risk of insects being imported but has heightened the conflict between disinsection requirements and the convenience of airline operators.

The WHO Expert Committee on Insecticides met from 19 to 24 September in Geneva to consider the problem of aircraft disinsection and to recommend improved standardized and thoroughly practicable disinsecting procedures for early implementation by the International Quarantine Committee. When the Expert Committee's report is issued it will be reviewed in the Chronicle.

Training and use of auxiliary personnel

The WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel met in Geneva from 19 to 24 September to consider the use and training of auxiliary personnel in medicine nursing, midwifery and sanitation. The third report of the Committee published in 1956 covered the training and functions of nine categories of auxiliary health workers. This year the Committee considered only the four categories mentioned above so that each might be investigated more fully.

The main points discussed were the need for auxiliaries in public health programmes the use of auxiliaries their training including relation to the needs of the country type (basic courses on the job instruction) and location of training centres content of courses methods of teaching and learning qualification and registration of auxiliaries refresher courses and advanced training the training of teachers of auxiliaries the orientation of professional groups in the use of auxiliaries and the follow up of auxiliaries at work after training.

When the Committee's report is issued it will be reviewed in the Chronicle.

Planning public health services

A WHO Expert Committee on Public Health Administration met in Geneva from 1 to 6 August 1960 to discuss the planning of public health services.

Experience in planning such services in a number of countries was carefully reviewed and a series of general principles agreed upon. Owing to the differences in social cultural and economic conditions in various parts of the world the Committee could deal with the subject only from a methodological point of view. Brief studies of health planning work in Ceylon Czechoslovakia India the United Arab Republic the United Kingdom and the USSR were presented to the Committee and will appear as annexes to its report. It was agreed that as health planning is a developing activity further studies are needed to extend knowledge and experience in this field. The Committee stressed the importance of health planning in relation to economic and social development and the need for the use of econometric methods for the measurement of productivity in health work.

An account of the Committee's work will appear in the Chronicle when its report is published.

Laboratory diagnosis of virus and rickettsial diseases

A course on the laboratory diagnosis of virus and rickettsial diseases was held in Czechoslovakia from 4 September to 1 October under the auspices of the WHO Regional Office for Europe. It was a follow up of a seminar held in 1956 in Madrid and courses held in London and Paris in 1957 and 1958 and was the first course conducted in Russian to be organized by the Regional Office.

Half of the course was devoted to formal lectures and laboratory exercises at the Institute of Epidemiology and Microbiology in Prague and the remainder to practical field work in institutes and regional virus laboratories in Bratislava Brno and Ostrava. The participants came from Bulgaria Czechoslovakia Poland the USSR and Yugoslavia. There were 12 of

will be collected from both rural and urban areas and used to plan a practical and economical immunization programme for the whole country.

The vaccines will be manufactured at Kausali in accordance with WHO recommended procedures and a WHO consultant will be assigned to the project. Equipment apart from that already available in the country will be supplied by UNICEF.

Two workers from the Kasauli Institute are at present in Australia studying vaccine production and immunology including the production of triple vaccine against diphtheria, whooping cough and tetanus. On their return next year they will work with the staff of the special vaccine production unit. Another worker from the Institute will be similarly trained overseas at a later date. It is expected that the Institute will be able to produce 4 000 000 ml of vaccine a year to begin with and within three years will reach the target of 7 000 000 ml a year.

Aircraft disinsection

Until about thirty years ago ships were the main agency whereby insects were accidentally introduced into countries from overseas. While shipping fosters the dissipation of human ectoparasites, domestic insects and pests of agricultural products, stored products and timber, a great number of undesirable insects do not survive long sea journeys. These include species for which suitable larval habitats are not available aboard ship or which in the adult state have a very brief existence or become such a nuisance that control measures are taken against them during the voyage. The longer the voyage the less likely the survival of most anophelines and other mosquito vectors, provided that they are in the normally active stage during which both sexes must feed repeatedly. The males die because they are deprived of their natural food (plant juices etc.) while the persistent biting of the females leads to control measures which reduce their numbers.

With the development of international aviation a new situation arose. The brief flying time required for journeys taking several days or weeks by sea ensures the survival of insect

stowaways which suffer no ill effects from the flight. Moreover aircraft are entered by a greater variety of free flying insects of public health importance than are ships which are exposed only to the relatively limited range of species found in urban dock areas. International airports are mostly in rural areas where local vector insects and forestry and agricultural pests may flourish. The existence of a wide range of breeding sites near airfields favours both the entry of vectors and pests to aircraft and the establishment in the area of insects introduced from abroad.

As early as 1928 the transport of agricultural pests by airlines operating between Cuba, South America and the southern United States was having an effect on the plant quarantine situation. By 1930 the disastrous establishment of *Anopheles gambiae* in Brazil—probably by means of a fast naval vessel although there is a definite possibility that a pioneer air service was responsible—had focused attention on health aspects of the problem. Three years later the International Sanitary Convention for Aerial Navigation contained provisions for the disinsection of aircraft.

The great increase in international civil air traffic and the launching of a number of mosquito eradication programmes after the Second World War led to a reappraisal by WHO of existing disinsection requirements. A comprehensive survey of the subject up to 1948 was published in the WHO Bulletin¹ and the subject was dealt with in the first² and second³ reports of the WHO Expert Committee on Insecticides.

Despite considerable progress and the promulgation of spraying regulations by a number of countries and territories the need for improving and standardizing procedures remained. This was reflected in the recommendations published in 1957 in the seventh report of the WHO Expert Committee on Insecticides⁴ which also appeared as Annex 5 to the International Sanitary Regulations published in the same year.⁵ Since then there has been growing concern over the

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People and Places

Sirgthe ng health ser ices in In tones a

WHO is helping the Ministry of Health of Indonesia to plan and administer an integrated and co-ordinated public health programme. This calls for an evaluation of existing health work and training programmes, a study of staffing patterns and the formulation of administrative procedures.

WHO has appointed Dr David Penman of the United Kingdom as medical officer in Djakarta to help with this programme. Dr Penman is a graduate of Edinburgh University where he also obtained his degrees in public health and in tropical medicine and hygiene. After several years in the Royal Navy he worked as Resident Medical Officer in Malaya and as Assistant Director of Field Studies in a survey of general practice in Canada.

Training of malaria ologists

Since last year the Institute of Malariaology in Tala Ruzal Philippines has served as an international training centre for personnel taking part in the world wide malaria eradication campaign sponsored by WHO. The centre is a joint undertaking of the Philippine Government, the US International Cooperation Administration (ICA) and WHO.

Dr Arthur A. Sandosham, Professor of Parasitology and Principal of the University of Malaya, Singapore, has been appointed by WHO as Co-ordinator of Studies at the Tala Institute. He brings to this post some thirty years of experience in medical education and training and in malaria work. A graduate of King Edward VII College of Medicine at Singapore, Dr Sandosham holds a doctorate in philosophy from London University and an honorary doctorate in medicine from the University of Malaya. From 1930 to 1950 he was lecturer in biology and parasitology at King Edward VII College of Medicine, after which he joined the staff of the University of Malaya.

Tuberculosis chemotherapy

Dr H. Stott has joined the staff of the Tuberculosis Chemotherapy Centre in Madras where a comparative study of domiciliary and sanatorium treatment of tuberculosis is being carried out under the auspices of the Indian Government, the Madras Government, the Indian Council of Medical Research, the Medical Research Council of Great Britain and WHO.

Born at Ootacamund, India, Dr Stott studied at Cambridge University and at Guy's Hospital Medical School, London. He continued his medical education at the School of Tropical Medicine, Liverpool, Brompton Hospital, London, and the Royal Institute of Public Health and Hygiene, London. Since 1939 he has worked with the medical services in Kenya.

Insecticide resistance

Dr F. J. Oppenoorth, Scientific Administrator at the Laboratory for Research on Insecticides of the Department of Agriculture, Utrecht, Netherlands, has been appointed by WHO to co-ordinate research studies on biochemical and genetic aspects of insecticide resistance in vectors of public health importance. During this assignment he will consult with leading research workers in this field in Italy and the eastern Mediterranean area. Dr Oppenoorth has for several years been engaged in research into the physiological and genetic aspects of resistance in the house fly to chlorinated hydrocarbon and organo-phosphorus insecticides.

Yaws control in Liberia and Thailand

A yaws control programme has been operating in Liberia with help from WHO and UNICEF since 1953. The initial treatment surveys completed in 1957 indicated that approximately 19% of the population had yaws in one of its forms. However, a substantial reduction was

them in all bringing the total number of junior virologists in European countries who have attended courses of this kind up to 59. This has certainly had an influence on the application of laboratory methods in the diagnosis of virus diseases in Europe since at least one student from nearly every laboratory of importance in the Region has attended one of the courses.

Arthropod borne viruses

The list of viruses carried by arthropods (mosquitoes, ticks, gnats, etc.) is constantly growing. The total number already known exceeds 125 and it is certain that there are many more. One of the fundamental characteristics of these viruses is to require the intervention of an arthropod vector and vertebrate host for their maintenance in nature, with one or two possible exceptions: man is only a tangential or accidental victim. This does not mean, however, that they are of negligible importance for public health. Serious outbreaks of disease due to arthropod borne viruses have occurred in the past and are still occurring in many parts of the world: yellow fever, dengue, Japanese B encephalitis, Russian spring-summer encephalitis and the new Kyasanur Forest disease are good examples.

A WHO Study Group on Arthropod Borne Viruses met in Geneva from 5 to 10 September to consider *inter alia* problems relating to grouping and classification of these viruses, procedures for determining their presence or importance in unexplored or incompletely studied areas, their importance as producers of human and veterinary disease and possible control measures. An account of the Study Group's work will appear in the Chronicle when its report is published.

Medical rehabilitation

A course on the medical rehabilitation of the physically handicapped adult was held in England from 19 September to 8 October by the WHO Regional Office for Europe, with the co-operation of the British Government and the International Labour Organisation, in order to help meet the urgent need for trained personnel in this field. The United Nations, the International Society for the Welfare of Cripples, the World Confederation for Physical Therapy, the World Veterans Federation and the European Coal and Steel Community sponsored either fellows or lecturers for the course.

The course permitted participants to study the organization of up to date rehabilitation services, modern teamwork techniques and approaches to rehabilitation, and the treatment of significant cases of disability. The programme included a number of lectures on the general structure of rehabilitation and related services in the United Kingdom and visits to rehabilitation centres, orthopaedic hospitals, training centres for the disabled, institutions for the treatment of special groups and for fitting prosthetic appliances, etc. After each visit a group discussion was held on the services seen and the problems encountered.

The participants in the course came from Austria, Belgium, Czechoslovakia, Denmark, Germany, Ireland, Italy, Portugal, Spain, Switzerland, Turkey and the USSR. They included physicians, physiotherapists, nurses, prosthetic technicians, occupational therapists, disablement resettlement officers and social workers.

This is the second course on rehabilitation of physically handicapped adults to be organized by the Regional Office for Europe; the first was in Nancy, France, in 1957.

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WORLD HEALTH ORGANIZATION

observed in subsequent resurveys covering the whole country. The programme is now entering the consolidation phase. Dr K. Vigors Earle of the United Kingdom has been appointed WHO Medical Officer to the programme succeeding Dr H. Dirckze who is retiring. Before joining WHO, Dr Earle had wide experience in tropical medicine in West Africa, Latin America and East Asia.

During the past ten years, the national teams working on the WHO/UNICEF assisted yaws control programme in Thailand have examined some 19 748 000 people at initial surveys and resurveys and treated or re-treated about 1 351 000 cases of yaws. Mrs Helen A. Patterson of the United States has been appointed WHO statistician to this programme and will assist in planning yaws surveys and evaluating methods and results. Before joining WHO, Mrs Patterson worked in the statistical departments of the National Academy of Sciences in Washington D.C. and the Atomic Bomb Casualty Commission in Japan. She holds an M.A. degree in sociology and anthropology.

Mental health

Dr Jorge Velasco Alzaga of Mexico has been appointed Regional Consultant in Mental Health at the headquarters of the Pan American Sanitary Bureau which acts as the WHO Regional Office for the Americas. Dr Velasco Alzaga holds degrees in medicine and public health from the Military Medical School and the School of Public Health and Hygiene in Mexico City. He has also done post graduate studies in neuro-psychiatry, public health administration, mental health and psychoanalytical training in the United States and Mexico.

Appointments at WHO Headquarters

Owing to the growing activities of WHO it has been necessary to appoint a fourth Assistant Director General. Professor Fred Grundy, Mansel Talbot Professor of Preventive Medicine

in the Welsh National School of Medicine has been selected for this post and will be responsible for the Divisions of Public Health Services, Health Protection and Promotion and Education and Training. He is expected to take up his duties officially in 1961.

Dr Grundy obtained his medical degrees at Leeds University and the University of London; he is also a barrister at law. After five years of hospital work, he entered the public health service in England, eventually becoming Medical Officer of Health of Luton, Bedfordshire. Dr Grundy has served on many health committees in the United Kingdom and has been Chairman of the Health Visitor Training Committee of the Royal Society of Health, Vice Chairman of the Standing Conference of Health Visitor Training Centres and Vice President of the Royal College of Midwives. He is joint author with Dr J. M. Mackintosh of the WHO monograph *The Teaching of Hygiene and Public Health in Europe* and has served as consultant to the WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel.

Dr Louis Verhoestraete has been appointed Director of the Division of Health Protection and Promotion, WHO Headquarters. This recently created division groups activities in the fields of cancer, cardiovascular diseases, dental health, mental health, nutrition and social and occupational health.

Formerly Chief, Health Promotion Branch of the Pan American Sanitary Bureau (PASB) which acts as the WHO Regional Office for the Americas, Dr Verhoestraete obtained his medical degree at the University of Louvain and subsequently did post graduate work in Ghent, Leiden and Birmingham. He received the degree of Master of Public Health from Harvard University in 1954. From 1942 to 1947 he was provincial maternal and child health adviser for the Belgian Oeuvre Nationale de l'Enfance. He joined WHO in 1947 as a consultant in paediatrics and served as Chief, Maternal and Child Health, WHO Headquarters, before his transfer to PASB in 1954.

ADVANCES IN RABIES CONTROL

In 1958 in 65 out of 108 countries and territories to which WHO addressed a questionnaire about rabies nearly 500 000 persons received antirabies treatment mostly after having been bitten 865 persons died without having received treatment 82 died during or after treatment and 49 developed paralytic complications after vaccination Incomplete though these figures are they represent a great deal in terms of human suffering and effort Each of the 500 000 persons vaccinated had a series of on the average 14 or 15 painful injections keeping him (and often his family too) for weeks close to the institution where he was getting the injections Each person also was in fear of death, should the treatment fail—a fear prolonged sometimes for months since the incubation period of the disease may be long Laboratory workers producing the vaccine had to manipulate dangerous viruses inoculate them into the nervous systems of the animals whose brains or spinal cords were used as vaccination material treat these tissues by inactivating agents in special apparatus and test vaccine potency in guinea pigs rabbits or mice—for which several weeks of work were often required Humanity still pays a heavy tribute of suffering to this frightful disease But whereas before the time of Pasteur it occurred frequently following the bite of a rabid animal it is now much rarer thanks to the increasing effectiveness of vaccination methods resulting from collaboration on an international scale for rabies if untreated has such a terrifying outcome that countries and continents early came together to devise methods of combat _{in it}

Since the International Rabies Conference in 1927 as a result of which the Health Organisation of the League of Nations was entrusted with the task of collecting on the basis of questionnaires to countries with suitable institutes data on the number of cases of rabies the results of treatment and the effectiveness of the various kinds of vaccine inter-

national work on the disease has continued unabated In the last ten years in particular there has been considerable progress WHO aiding by giving assistance to laboratories organizing surveys facilitating exchanges of views and material among research workers bringing experts together and disseminating through its publications knowledge of method of producing and testing vaccines In this way WHO has imparted momentum to research into rabies and to the practical application of the results achieved The fresh advances are briefly described in this article the source of which is the replies of 89 countries and territories to the latest questionnaire on the subject sent out by WHO¹ and the recently published fourth report of the WHO Expert Committee on Rabies²

Distribution of rabies in the world and sources of infection

The WHO questionnaire was sent to some 300 laboratories institutes health organizations and veterinary departments in 109 countries and territories It was very favourably received, and the 222 replies from 89 countries give a general picture of rabies throughout the world Of the 109 countries consulted 63 had recorded cases of rabies in 1958 76 had been free from the disease and 20 gave no information

Which rabid animal are most dangerous to man? The rabies virus has been found in a large number of animals but not all transmit the infection While one of the animals most liable to transmit infection is the dog in many countries—particularly those where canine rabies has been brought under control—wild animals are more dangerous in this respect In Germany Canada parts of the USA and Poland the fox plays a greater part than the dog in spreading rabies in the USA the skunk

¹ These replies are analysed in unpublished work on document R b 05 1 f
² *Wild Hlth Org Echo R p S* 1960 201

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

TABLE 1 GUIDE FOR SPECIFIC POST EXPOSURE TREATMENT

N t f e pos	B t g a m l		Rec mme d d r e i m t (h add t o n t l o c l t r a i m t l)
	At t m f p o e	D g o b s e r v a t o o f t p e r i o d d a y s	
L N l e s d e c t n t a c t	R b d	—	N
H L i k s (1) b r a d d s h (2) a b r a d d k r a t f b r a d d b r a d d m s a	P b d	—	N
	(1) h l t h y	C l i c l i g o f r a b l s o r p o v e a b d (1 b r a t o r y)	S t r t l t f l t s g o f r a b l t h b t g m a l
	(b) g g o t i v e t b s	Healthy	S t r t v a c m m e d l y t t t m t f a n i m f l n o m l f f t h d t e p o s
	(c) b l d s c p d k l l e d k o w	—	S t r t v a c i m m d t l y
H B t s (1) m d e p	(1) h l t h y	C l i s g o f r a b p o v (1 b r a r y)	S t r t v a c t f t g o f r a b t b t g m l
	(b) g g o t i v e f o e s	Healthy	S t r t c i m m d a l y s t t r t m t f a n i m f l n o m l f f t h d t e p o s
	(c) r a b d c a p d k l l d o r k o w	—	L a r t v a m m e d t l y
	(1) w l d (i f k l f b a t t)	—	r u m m m d l y f l o w d b y c o u s t c t
	(1) h t	C l i s g o f r a b p o v (1 b r a r y)	S e m m m d l y t r t t t f t g f r a b t b t g m l
	(b) g g o t i v e t b s	Healthy	S e r u m m m d l y f l o w d b y v a c m y b s t p p d f m l o r m l f f t h d t e p o r e
	(c) r a b d c a p d k l l d o r k o w	—	S e r u m m m d l y f l o w d b y t

Th h d l p p l e q l l y w h t h n o t h b t g m l h s b p w o u l v a t e d
t d t m t h t t b t k w h w i l t h s g d d t l l e d h i s t r y f a c t m s t f e p s e s t a l
Th g n e r a l p l s w h i c h t h f r g g d b a e d t h t m i d e p e s e f v a c f l l w g
A s t r e t t e t t h t h f l l w g p v d i a l l f p o v o k d w i d m a l b t m r a b
s e m l o g t h w t v a h l d b e m p l d A w i t h v a t m p o r t t t s t r m b e d s h u m d v a
t r e t r r l y s p o b l c m S e r u m h l d b d m t p l d s e (t l t h 4 0 l m l
C d p k g f b o d y w g h t) t t h t r i o f f t m t f l l w d b y a f n o t l e s t h 1 4 d l y d s f c e j
s e w h m l w d b y f l c u r a o f c t g e s t e d a t t s p l m t i d o f v a b d m
s t e d t 1 0 d 2 0 d y f l l w g t h m p l e t f t h l v a s h d l w i t h p n s b l t h p i m t l
d s e s h l d b w i n a f n e v o l e p
S e t t l y e c o g d n a t t h t b l y g d d e r t n t s p e c i f n d i o n s m w r a t m o d f c a s
g p o s k o w t b p o t t h g h i n a m a l t h t m f p o l d d t b h e a l t h y S h m
l u f y r t m t m m d t m o d i f i e d w y P o l m o d f t o n w o l d b t h f l l w g l o c a l t r m t o i t h w o u d
f d f s e m o r t d o s e f v a t d l y t r i d f r t h b g v e a s i g t n u m l
w y h l t h y 1 0 d y f l l w g e w h h m o d f d i r p e t a t i o n f t h e r e m m d e l m a y b d t d i
t a t t b f r e h t f q t b o r e t o m a l b t r e n c e r e d t s h o c t d q u e s t l a b o r a t o r y
d f l d p d t t g f c l w t h s p s i d m a y i t y i n l o c a l h t h u t t i m m d g
n o e c i f c t r a b t t m t
t C o u r s o f v a c c i n e t b f o l l o w d b y p p l m m a l d s e f v a n e o f n r v o t e f p o s s b l 1 0 d 2 0 d y s
n e r t h l a t s u i d s e

is an important vector and in the continent of America especially insectivorous bats have begun to assume prominence as vectors—whereas up to 1953 only the vampire bats of South America had been known to be carriers of the disease. In 1953 the rabies virus was isolated for the first time from an insectivorous bat and since then it has been isolated hundreds of times in 24 of the states of the USA and in one Canadian province from mainly gregarious but also from solitary bats. Infection in bats is not confined to America—it has been reported in Turkey and Yugoslavia and has been suspected in one case in Western Germany and in India.

In Asia jackals, wolves and foxes are with dogs the animals whose bites are most to be feared. A well known instance² is that of the rabid wolf that came down some years ago from the high plateaux of Iran and attacked sleeping villagers biting them savagely. Among these villagers some escaped death only because of a relatively new form of treatment in which serum was combined with the vaccine (see below).

Vaccination against rabies

Ever since Pasteur showed the way virologists have been concerned to protect human beings from the suffering caused by the introduction of rabies virus into the nervous system by the bite of an infected animal—a pathological process unique of its kind. Nevertheless from 1885—the date when vaccination with dried rabbit spinal cord was first introduced—to 1925 progress was slow and attempts at innovation were for the most part short lived. Only after that date were new paths opened up with the development of immunological research and improvement in techniques for preparing vaccines and sera and in methods of assessing their activity—all this work being stimulated by international collaboration.

In the past few years progress has been spectacular. A method of effectively vaccinating persons bitten by rabid animals with serum and vaccine has been developed. Vaccines have been prepared from chicken and

duck embryos which are almost free from the factor responsible for post vaccinal allergic encephalitis and which can be freeze dried and so kept in a stable form and a hyper immune serum prepared from animals and with antibodies concentrated by special processes has been tested and adopted. With these advances more effective methods of prophylaxis are now feasible.

Post exposure treatment with serum and vaccine

As the fourth report of the WHO Expert Committee on Rabies says this [combined serum and vaccine treatment] is definitely the best method now available. It is specially indicated in severe exposures (head and neck bites). Protection against rabies depends on active immunization achieved by the production of antibodies under the stimulus of the vaccine. But even if the first of the large number of injections needed is carried out immediately after the bite several days elapse before antibodies are detectable in the serum. During this period the virus inoculated with the bite of the animal may multiply particularly if it is inoculated in large quantity outstripping the defensive measures and thus causing them to fail. With a view to obviating this danger and creating an immediate barrier to the virus a method of treatment with serum was tested for some years and then adopted and it now forms a part of standard immunization methods. Serum with a high antibody content (hyper immune serum) is used. It is prepared usually from horses, donkeys or mules and is injected along with the first dose of vaccine. By temporarily slowing down or halting the multiplication of the virus it gives time for active immunity to develop. The dose should be not less than 40 International Units (1 IU = 1 mg) per kg of body weight followed by a course of not less than 14 daily doses of vaccine when the full treatment is given. Two supplemental doses of vaccine—preferably with a vaccine of other than nervous tissue—should be administered 10 and 20 days after completion of the course of vaccinations. This is an innovation and was introduced

(40-60) passages through chicken embryo (LEP) or have undergone more than 180 passages (HEP) which decreases their virulence still more and makes them suitable for use in man and animals

On the other hand there are *inactivated vaccines* treated with phenol or ultra violet rays and prepared either from animal nervous tissue or on duck embryo. The strain of fixed virus used at the Institut Pasteur Paris is—it is of interest to note—in the direct line of the one Pasteur himself used for the first attempts at vaccination in 1885. This strain has been kept going in rabbits and has undergone more than 2000 passages since the culture was originally made.

Not all strains of virus can be used for the preparation of vaccines. The WHO Expert Committee on Rabies recommended at its last session that for the production of any vaccine a particular strain of virus should be used that has given satisfactory results in the laboratory and in the field. Such a strain is obtainable from WHO on request.

Of the 137 institutes approached by questionnaire 94 replied that they were producing vaccine. At least 66 of them produce vaccine for use in human beings 52 for use in animals and 30 for both. At the head of the list comes the Semple type vaccine followed by the Fermi type. Ultra violet ray irradiated vaccine is produced by only four institutes (in Chile Japan India and the USA) because of the special equipment needed. Avianized vaccines are produced especially for use in animals. A few institutes do however produce HEP and duck embryo vaccines for use in man, these vaccines having the advantage of being practically free of encephalitogenic properties. Sheep are the animals mainly employed for the preparation of vaccine in nervous tissue but rabbits are also in common use. Other animals employed for the preparation of human vaccines are the mouse monkey and guinea pig and for animal vaccines the buffalo calf dog horse donkey and mouse.

Of the 94 institutes producing vaccine 78 use a potency test and 8 do not. 8 did not reply on this point.

The international reference vaccine was

found useful by 29 laboratories. Since 1957 this vaccine has been placed by WHO at the disposal of laboratories wishing to check the potency of their own products. It is a dried ultra violet ray inactivated vaccine the first batch of which (155D) was rapidly exhausted. It has recently been replaced by a second batch (164) prepared by the US National Institutes of Health (NIH).

The WHO Expert Committee urged in its recent report that each national laboratory prepare its own stock of reference vaccine which, after comparison with the international reference vaccine, could be used to supply other laboratories in the country. This is made more practicable by the recent development in the USSR of a method of freeze drying phenolized vaccine. Ideally the reference vaccine prepared by each country should be used in the potency testing of every batch of vaccine produced by individual laboratories by the NIH potency test technique.

As for the schedule of vaccination in human beings most institutes give 7-14 vaccinations, the total amount of nervous tissue for the complete course of treatment varying between 1 and 4 g (60 institutes) and being over 6 g with only 2 institutes.

Antirabies serum

Serum with a high antibody concentration—the so-called hyperimmune serum—is prepared in 28 of the institutes that answered the questionnaire and all used equines for the purpose. While 8 of the institutes employ the serum for experimental purposes only 18 use it for treatment in conjunction with vaccine. In antirabies prevention in the USSR gamma globulin is used in a dose of 0.25 ml per kg body weight.

The opinion of the institutes producing vaccine was that treatment with serum should be used mainly for severe cases, especially when there have been bites on the head, neck and face, and that it should be given as soon as possible after exposure. Twelve of these institutes assess the potency of their serum by the international standard serum. In its recent report the WHO Expert Committee reviewed the technique of potency testing and pointed

because experimental work indicated that serum partially inhibits the production of active immunity by the vaccine the two supplemental doses of vaccine exert a booster effect (see below) Table 1 provides a guide for the treatment of persons exposed to the risk of contracting rabies It was drawn up by the WHO Expert Committee on Rabies and replaces the table appearing in the Committee's third report

To increase the chances of success this treatment with serum and vaccine should be supplemented by local treatment of the wounds with various antiseptics Such local treatment has been the subject of numerous studies⁴ Another suggestion is that part of the dose of serum should be injected into the tissues underlying the wound and Soviet research workers recently advocated the local application of powdered gamma globulin containing antibodies against rabies This procedure is at present under study

Immunization before exposure

Particular groups of individuals such as veterinarians dog handlers field naturalists and laboratory workers are unusually exposed to the risk of being bitten by rabid animals To vaccinate them each time they are bitten would be to increase the possibilities of their having severe reactions to the vaccine Two types of vaccine have accordingly been prepared—the duck embryo and the HEP chicken embryo vaccines—for the prophylactic vaccination of these groups both are almost devoid of encephalitogenic properties The immunization schedule suggested is three intradermal doses 5 to 7 days apart followed by a booster dose administered one or more (preferably 2-6) months after the last dose of vaccine However not all vaccinated individuals give an antibody response and booster doses should be repeated till antibody is detectable A single injection of potent antirabies vaccine given even a long time after antirabies treatment results in a prompt and significant antibody rise consequently a single booster dose is sufficient for a person who has had the treatment and has shown an

antibody response if he is mildly exposed If however the exposure is severe it would be preferable until further information becomes available for him to undergo the full treatment with serum and vaccine

Vaccines and their production

Since the pioneer days of vaccination—the age of Pasteur when vaccines were more or less virulent according to the extent that they had been dried the preparation of vaccines has taken great steps forward Table 2 shows the vaccines now available for immunization of man and animals

TABLE 2 VACCINES AVAILABLE FOR IMMUNIZATION OF MAN AND ANIMALS

Vaccine	Strain of virus	Tissue used for preparation of vaccine	For use in
Live virus			
LEP	Flury 40-60 egg passage	Chicken embryo	Dog
K	Kele	Chicken embryo	Dog and cattle
HEP	Flury above 180th egg passage	Chicken embryo	Cattle cat dog and man
Nervous tissue	Fixed	Central nervous system	Man dog cattle and other animals
Inactivated			
Duck	Fixed virus	Duck embryo	Man
Nervous tissue	Fixed virus	Central nervous system	Man dog cattle and other animals

Available in freeze-dried form

Available in liquid form

There are on the one hand *live virus vaccines*—fixed viruses (a) propagated on nervous tissue from inoculated animals and used as vaccines in greater or lesser dilutions (from 1/8000 to 1/20000) or (b) propagated on chicken embryo The latter if of the Flury strain have either undergone relatively few

result of measures of this kind—vaccination and destruction—there was a striking drop in the incidence of rabies in Israel and Malaya.⁵ In reply to one of the questions in the questionnaire 9 countries where rabies occurs said that they had no restrictive legislation while 36 countries in which rabies is endemic and 21 that are free from rabies said that they had issued regulations to prevent the introduction of rabies infected animals.

But the most serious unknown factors are wild animals, the least controllable sources of rabies virus. The role of the fox has been mentioned. In Canada it was found in 1947 that foxes and wolves had become important reservoirs of the disease. Rabid animals lose their wildness, enter camps mix with sledge animals and accompany the teams (the "mad" foxes of the trappers). Intensive hunting of the fox and the wolf for their skins during the first quarter of the century undoubtedly reduced their numbers, but with the fall in the value of their skins they began to increase again and moving southwards perhaps in pursuit of the small animals on which they prey they have occupied areas formerly free from rabies.⁶ The fact that rabies is detectable in foxes by visible signs of involvement of the nervous system enables the animals to be tracked down—they are not believed to be asymptomatic carriers. But it has been shown that the disease affects the animal for a fairly long period during which its saliva is infectious—and thus prolongs the danger.

Trapping poisoned baits (e.g. thallium sulfate for mongooses and strychnine treated eggs for skunks) and gassing of dens are among the most effective procedures in use for control with the aim of reducing the population level to a threshold that will no longer be able to support an epizootic of rabies.

The role of "silent carriers" played by bats has been mentioned. It is impossible at present to recommend defence measures against these animals unless perhaps to use naphthalene flakes or fumigant gases to rid human dwellings of them and then take steps to prevent their return.

The WHO Expert Committee warned against picking up or handling sick bats or bats behaving strangely. Persons bitten by bats should be given antirabies treatment.

Future research

Among the subjects that deserve further study are the local treatment of bites, the best method of injecting non nervous tissue vaccine (intradermally or subcutaneously), the stability of freeze-dried phenolized vaccine, improvement in the methods of rapid diagnosis, the development of highly antigenic non nervous tissue vaccines, the production of hyperimmune serum of human origin, the cultivation of rabies virus on tissue culture and the possibility of using tissue culture for preparing a non nervous tissue vaccine for use in human beings. Finally there are the problems of ecology, the pathogenesis of rabies in animals and the detection of unknown reservoirs.

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out that the International Standard for Anti-rabies Serum is in the custody of the Statens Seruminstitut Copenhagen which will make it available on request

Drawbacks to treatment and ways of dealing with them

Reactions to antirabies horse serum even though the serum is purified and concentrated occur to approximately the same degree as with other animal sera (in roughly 20% of cases). Possible allergic reactions should therefore be avoided by taking a careful history of any previous allergy and by routine sensitivity testing—and if there is sensitivity by desensitization. The incidence of serum sickness can be reduced by administration of antihistamines.

As for neuromuscular complications after treatment with nervous tissue vaccine these vary in frequency from country to country, for unknown reasons. The type of population involved the physiological state of the individual the species of animal used for the production of the vaccines the method of inactivation or the dosage schedule may play a part. These accidents are sufficiently common in some parts of the world for research to be carried out in an effort to put an end to them. While avian vaccines may take the place of nervous tissue vaccines when symptoms give rise to the fear that neurological complications may occur they should not be given to persons known to be sensitive to egg protein without proper precautions.

Since the beginning of combined serum vaccine treatment it has been observed that the serum inoculated with the first dose of vaccine inhibits to a greater or lesser extent the production of antibodies stimulated by the vaccine. This inhibition is particularly noticeable in short courses of treatment when the number of injections of vaccine is less than 14 and the serum may even interfere with the ability of the subject to respond to a booster dose of vaccine given 30, 60 or 120 days after the first course—a response that usually appears within 8 days as a rise in the antibody level. The schedule of treatment was drawn up so as to reduce the inhibiting effect of the serum to the greatest possible degree.

Fluorescent antibody test

The classic diagnostic techniques (examination for Negri bodies isolation of the virus and the sero neutralization test) have recently been supplemented by new methods in particular the fluorescent antibody test. This test to quote the Committee's report "is based upon the microscopic examination of tissue specimens for specific fluorescent staining when the tissue is placed in contact with antirabies serum which has been tagged (or labelled) by the addition of a fluorescent dye. This fluorescence is visual evidence of specific antigen antibody reaction. The investigations of this diagnostic method have revealed that this test when properly executed can establish a highly specific diagnosis on test specimens within a few hours and that there is a high degree of correlation between the fluorescent antibody and the mouse inoculation test.

The Committee wished to encourage rabies diagnostic laboratories to develop proficiency in carrying out this test in order that further comparative studies can be done with this and other diagnostic tests. It pointed out however that exacting standards of performance equipment and reagents are necessary and these are related to adequate training and proficiency of the diagnostician as well as to the quality of reagents and equipment employed.

Control of reservoirs and vectors

To improve the situation and in the long run to achieve the ultimate aim of eliminating rabies action must be taken against the animal reservoirs or vectors of infection by destruction or vaccination. Mention has already been made of the large number of species that can carry the infection. The WHO Expert Committee devoted special attention to dogs on the ground that vaccination of dogs is one of the strongest weapons against rabies in countries where there are infected areas. Full details on the immunization of dogs and also of cats and cattle will be found in the report. Stray dogs that miss being vaccinated and are potential sources of infection should preferably be destroyed. As a

result of measures of this kind—vaccination and destruction—there was a striking drop in the incidence of rabies in Israel and Malaya.³ In reply to one of the questions in the questionnaire 9 countries where rabies occurs said that they had no restrictive legislation while 36 countries in which rabies is endemic and 21 that are free from rabies said that they had issued regulations to prevent the introduction of rabies infected animals.

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³ Chron. Wild Hlth. Org. 1954 8 63

⁴ B. H. Wild Hlth. Org. 1954 10 767

POLIOMYELITIS PREVENTION

Only six years ago a WHO Expert Committee on Poliomyelitis¹ stated that vaccination procedures against poliomyelitis are still in an experimental stage and that poliomyelitis vaccines of unquestionable value are not yet available for general use. In that short space of time extraordinary progress has been made in the development of active immunization procedures and vaccination against poliomyelitis is already being practised on a very extensive scale. Not only have inactivated vaccines been used for this purpose but within the last three years intensive studies have been made of live attenuated poliovirus vaccines and in some countries they have been used successfully for mass immunization programmes. Experience with live poliovirus vaccine from 1957 to 1959 and some of the problems raised by its use were reviewed recently in the *WHO Chronicle*² following an international conference on the subject convened jointly by WHO and the Pan American Health Organization in June 1959. A second conference was held in June 1960 and the information collected placed before the Expert Committee on Poliomyelitis³ which met immediately afterwards. In its third report⁴ the Committee evaluates this material as well as the most recent experience with inactivated vaccines and formulates a number of recommendations for future policy and research.

Inactivated vaccines

In most countries where inactivated vaccines have been widely used the protection

obtained has been of the order expected on the basis of field trials. In the USA more than 300 million doses of vaccine have been used for vaccination programmes within the country. During 1959 it was estimated that the effectiveness ratios in triply vaccinated persons were over 90% in the age group 0-14 and 82% in the age group 15-39. For persons vaccinated 4 times the ratios were 96% and 86% respectively. The data on which these estimates were based were derived mainly from the case reports submitted to the Poliomyelitis Surveillance Unit from the Census Bureau random sample survey and from an intensive study of a local epidemic in Des Moines Iowa. In the latter epidemic cases were found to be concentrated in the central areas of the city in contrast to experience before immunization. The highest rates were found in the poorly vaccinated lower socio-economic group of the population a finding confirmed in other local epidemics.

During an outbreak of poliomyelitis in Winnipeg Canada in 1958 the attack rate per 100 000 in the age group 5-9 was found to be 9 times as high among unvaccinated as among vaccinated children. In the age group 10-14 it was 4.5 times as high. In Canada as a whole the reduction in cases of poliomyelitis attributable to vaccination during 1958 was estimated to be around 98% while during 1959 the over all effectiveness rate was estimated to be 96%.

In England and Wales where 6 000 000 children had received 2 or more doses of inactivated vaccine by the end of 1958 the attack rates were 4.3 per 100 000 in vaccinated children and 21.4 per 100 000 in unvaccinated children. The corresponding rates for paralytic cases were 2.4 per 100 000 and 15.1 per 100 000. The fatality rate was over 10 times as high in the unvaccinated as in the vaccinated children.

Somewhat similar figures have been reported from Australia the Union of South

1. *Wld Hlth Org t h R p S* 1954 81 9
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 Members of the Committee: Sir M. F. L. Barnett, A. L. Pr. fesso S. G. d. S. w. den D. J. H. S. G. U. i. n. of S. i. h. Af. Dr R. Murray USA (Rapport r) Professo J. R. P. I. USA Dr V. Sk. an k. C. echo l. k. P. f. so C. H. S. i. r. Harris U. i. d. k. g. d. m. (Ch. a. r. m.) P. ofesso V. M. Zhd. USSR (V. Ch. r. m.) Secret. t. D. A. N. B. PASB/WHO D. R. D. i. b. e. c. o. USA (Co. l. t. a. t. o.) Dr A. M. M. Pay. e. WHO (S. e. r. i. t. y) D. M. N. d. S. i. a. PASB/WHO
Wld Hlth Org t e h n R p S 1960 203

Africa and a few other countries but there have also been some less favourable experiences. In the islands of Rodriguez and Mauritius intensive vaccination failed to stop an epidemic of poliomyelitis although there was a marked difference in rates between vaccinated and unvaccinated persons. In the Moscow region of the USSR little change was noticed in the incidence of poliomyelitis between 1955 and 1959 although nearly all children under the age of 14 years had been vaccinated. For the USSR as a whole there was a decrease from about 70 000 cases per annum in the period 1955-1957 to about 12 000 in 1958 by which time a total of 15 million persons had been vaccinated. This decrease was considered too small and a programme of live virus administration initiated as described below. Unsatisfactory results have also been reported from Czechoslovakia and from Hungary where an epidemic with an attack rate of 24 per 100 000 broke out in 1959 in spite of a vaccination programme covering about 70% of the age group 6 months to 19 years.

Differences in the mode of administration and variations in potency may be partly responsible for these discrepant findings as shown by experience in Sweden. Using Swedish vaccines conversion rates between 65% and 100% were obtained whereas with imported vaccines the conversion rates were 20-35%. The ratio of observed to expected cases was 0.78 for imported vaccines but only 0.035 for domestic vaccines.

No serious production or testing problems have been encountered during the last three years. Method of inactivation have remained virtually unchanged and the various national requirements and the recommendations issued by WHO have been demonstrated to assure a safe vaccine which has been satisfactory in use. In the light of this experience there seems to be less cause for concern regarding the strain composition of inactivated vaccines and some countries have used alternative strains. The choice of vaccine strain depends mainly on its suitability to the manufacturing process and its ability to produce a vaccine of acceptable antigenicity. Unfortunately there is as yet no international

agreement regarding acceptable antigenicity levels and the best methods of antigenicity testing. Under the auspices of WHO a collaborative international assay is at present being conducted using a number of different vaccines and comparing the various antigenicity tests in use. It is hoped that once a satisfactory antigenicity test has been selected it will also enable information to be obtained on the stability of poliomyelitis vaccines under various conditions of storage.

A number of polyvalent vaccines containing poliomyelitis antigen have recently been given a trial in several countries. Some special manufacturing and testing problems have been encountered such as the undesirable effect on the spinal cord of monkeys of the adjuvant used. A revised potency testing procedure is needed. Some combinations appeared to show an enhanced potency when injected into animals although no potentiating effect could be demonstrated in children. It has therefore been necessary to perform the safety and potency tests on the poliomyelitis antigen alone as well as on the final product. The use of multiple antigens would enable at least some of the doses of poliomyelitis vaccine needed for immunization to be administered along with the usual immunizations of early childhood but experience is still too limited for their value to be properly assessed.

Live poliovirus vaccination

In addition to the large scale trials already described in the *WHO Chronicle*⁴ mass immunization with live poliovirus vaccines has been practised in several other countries of eastern Europe, Asia, southern Africa and Latin America. A nation wide immunization programme with monovalent and with trivalent Lederle vaccines was started in 1959 in Costa Rica. By April 1960 more than 120 000 children under 11 years of age had received all three doses of monovalent vaccine and nearly 150 000 had received at least one dose of trivalent vaccine. In addition some 2000 newborn children received a bivalent vaccine.

⁴WHO Chronicle 1960 14: 137-142.

(types 2 and 3) during the first 48 hours of life followed by a monovalent vaccine (type 1) at about 1 month of age. Conversion rates were good for types 1 and 3 in all these studies but rather low for type 2. In the metropolitan area of San Jose the attack rate in 1960 was 168 per 100 000 among unvaccinated children and 14 per 100 000 among vaccinated children. Very similar results were obtained in the department of Managua, Nicaragua, where approximately 50 000 children between the ages of 2 months and 10 years were vaccinated in the period July 1958 to May 1959. In Uruguay about 325 000 persons of all ages in the city of Montevideo were given monovalent Lederle vaccines types 2, 3 and 1 in that order beginning in May 1958 but an outbreak of poliomyelitis developed in October 1958 before type 1 vaccine had been administered. Among the population of Montevideo there were 87 paralytic cases mostly due to type 1 virus.

Studies with Sabin strains have been made in Mexico. Following favourable results of preliminary trials large scale field programmes were initiated in February 1959 in Mexico City, Monterrey, Guadalajara and Puebla. Monovalent vaccines were used administered at intervals of 3-4 weeks. Approximately 150 000 children under the age of 5 were vaccinated representing 17.52% of the age group depending upon the area. Poliomyelitis due to type 1 virus was already present in all four cities and after the start of the programme 660 cases occurred in unvaccinated children and 35 among those who had been vaccinated. A programme aiming at more complete coverage was initiated in August 1959 in Toluca where 80% of the population under 11 years of age—a total of 26 000 children—received a trivalent mixture of the 3 Sabin strains within a period of 4 days. In this way it was hoped to overcome the phenomenon of interference by enteroviruses. Serological conversion rates 10 weeks after vaccination were 68%, 82% and 43% for types 1, 2 and 3 virus respectively. A second dose administered to 44 children who had failed to respond to one or more types gave conversion rates after another 6 weeks of 96%, 96% and 72% respectively.

Live poliovirus prepared from Sabin strains has also been used on a large scale in the USSR, Czechoslovakia, Bulgaria, Hungary, the German Democratic Republic and Albania as well as in the Republic of Viet Nam and on a limited scale in China. In the USSR a mass vaccination programme was instituted early in 1959 and by the end of the year over 15 million people had been vaccinated. During 1960 the programme was extended to cover the whole population between the ages of 6 months and 20 years and within the first 5 months some 50.60 million persons were vaccinated. In the Baltic republics where mass vaccination was performed during the first three months of 1959 the antibody conversion rate 3 months after vaccination was 94.98% to all three types of virus. Similar conversion figures were obtained in other regions. Reactions occurred in less than 3 per 100 000 vaccinated persons and were always mild consisting mainly of transient fever, nausea, vomiting and intestinal symptoms. There was no evidence of an increase in cases of poliomyelitis during the 4-5 weeks following vaccination. On the contrary in the Baltic republics there was a striking drop in incidence and poliomyelitis almost disappeared. In all areas where the vaccination programme was completed before the anticipated seasonal rise in incidence this did not occur.

Using similar vaccines about 3.5 million children have been vaccinated in Czechoslovakia, 2.5 million in Hungary, 2.2 million in Bulgaria, 1.5 million in Viet Nam and some tens of thousands in the German Democratic Republic and China. The final results were not available to the Expert Committee but no complications had been reported.

A mass immunization programme with a vaccine prepared from Koprowski strains was started in Poland in October 1959 and completed in April 1960. Serological conversion rates of 89-100% were observed and epidemiological results are awaited.

Other trials with live poliovirus vaccine have been made in southern Africa, Florida (USA) and Singapore. In the island of Mauritius an epidemic due to type 1 virus terminated abruptly after 195 000 out of 212 000

children under 10 years of age had been given the corresponding type of vaccine within 3 days. Although the epidemic appeared to be already on the wane when the campaign was begun, vaccination seems to have brought it to an end more quickly. In Singapore, Sabin type 2 virus was administered to 199 000 children in the face of an epidemic due to type 1. It appears to have afforded considerable protection.

Safety of live vaccines

In almost all the trials with live vaccine carried out so far, untoward post-vaccinal reactions have been absent or insignificant, and there has been no evidence that cases of poliomyelitis have been induced either directly or indirectly by administration of the attenuated virus. On present evidence, the fear of harmful effects due to the spread in the community of the progeny of the vaccine virus also appears to be unfounded. While these results have increased confidence in the use of attenuated viruses, the Expert Committee believed that further data must be accumulated before the unlimited use of live vaccines can be recommended without reservation. One of the most important questions still to be answered is how a true measure of safety can be devised and the possible clinical risks determined from field trials. A first requisite is that surveillance measures should be put into operation at the start of a vaccination programme and continued for 6-8 weeks after the programme has been terminated. While close surveillance is relatively simple in the case of small field trials involving not more than 500 persons, it becomes increasingly difficult with larger trials, and as more and more people are vaccinated, the problem of finding a suitable unvaccinated control group grows more acute each year. If the surveillance measures cannot embrace every participant in the vaccinated and control groups, it is essential that adequate sampling techniques should be employed.

Where trials are carried out at a time when cases of poliomyelitis are occurring in the district, it may be difficult to determine the true significance of post-vaccinal infections

of the central nervous system. The Committee believed that all cases of poliomyelitis beginning within 5-30 days after ingestion of the vaccine should be investigated to determine whether they are due to the vaccine virus. This might be established with the aid of specific genetic markers to identify the particular strain isolated from the patient, but so far differentiation by this method has not proved very easy in practice. On this subject much more research is needed.

Special safety problems arise in connexion with the immunization of certain groups such as premature or newborn infants or pregnant women. Infection of the alimentary tract accompanied by virus excretion is readily obtained in newborn babies in order to ensure a satisfactory immunological response; however, it may be advisable to delay vaccination until the age of 3 months. The Committee recommended that caution should be observed in administering live poliovirus vaccines to persons undergoing treatment with corticosteroids or surgery of the oropharynx, and that elective surgical procedures including tonsillectomies and adenoidectomies should not be performed on persons who have recently been given oral vaccine. There is no evidence so far, however, that injections given to vaccinated persons are likely to provoke poliomyelitis. In the USSR, the following were admitted as contra-indications to the use of live vaccines: acute febrile states or other evidence of acute illness during the 2 weeks preceding the date set for vaccination; diarrhoea; intestinal disorders; tuberculosis; decompensated cardiovascular disease.

Attenuated viruses effective in producing a high level of serological responses have been found to spread readily to intimate family and household contacts, particularly in the lower socio-economic groups where hygiene is often poor. On the other hand, extra-familial spread does not appear to have been extensive, and the attenuated polioviruses do not seem to persist in a community after mass immunization. The fear has been expressed, however, that a vaccine virus might gain in virulence in the course of multiple human passages and give rise to an epidemic of poliomyelitis in a

neighbouring country where the vaccine has not been used. Although there is no evidence that this is a real danger the possibility cannot at present be discounted. More information on these questions is needed especially with regard to the effect of different conditions on spread. It is important also that there should be co operation between neighbouring states with regard to vaccination programmes and that the timing of such programmes should be co ordinated. The Committee was of the opinion that such co ordination might be best effected through WHO.

Live poliovirus vaccines have the great advantage of being cheap to produce and easy to administer. A disadvantage is the need to avoid contamination with extraneous viruses derived from monkey tissue. The Committee laid down a number of guiding principles for the manufacture and testing of live vaccines and strongly recommended that a WHO study group should be convened to draft international requirements. It also recommended that the study of simian viruses should be intensified particularly with regard to their pathogenicity for man and methods of differential inactivation in live poliovirus vaccines.

Efficacy of live vaccines

Take rates after live poliovirus vaccination can be estimated either by virus isolation or by serological conversion. It seems to be generally accepted that a valuable measure of the immunizing capacity of a vaccine is the antibody response in persons who previously had no demonstrable antibodies to any of the three types of virus. The Committee recommended that in the case of a monovalent vaccine at least 25 triple negatives should be examined before and 12 months after vaccination if a trivalent vaccine is used the number examined should be about 50 or even higher if other interfering viruses are known to be present in the community. The Committee emphasized the importance of selecting the sample on sound statistical principles.

Agreement has not yet been reached regarding the significance of the appearance of antibodies at the lowest demonstrable level. It has been assumed that for a monovalent vaccine

to be considered effective it should induce antibody formation in at least 90% of susceptible subjects. A response of this order has been achieved in many trials with most of the strains studied. The best evidence of an increased resistance to natural infection is considered to be excretion of virus by the vaccinee associated with a rise in antibody level. The average duration of virus excretion is 4-6 weeks but it may continue as long as 3 months. Sometimes it is unaccompanied by the development of demonstrable antibodies particularly in children under 3 months of age.

Ultimately the efficacy of live poliovirus vaccines will have to be judged by their ability to control or prevent paralytic poliomyelitis. Although they have not yet been in use sufficiently long to yield conclusive data some of the field trials discussed earlier in this article have already given encouraging results. A marked difference in morbidity between vaccinated and unvaccinated groups has been observed and in some areas there has been a striking change in the seasonal incidence of poliomyelitis after vaccination incidence was lowest in the second half of the year a time when it reached a maximum in previous years. The best results have been obtained when immunization was performed during the inter epidemic period.

Choice of strains

Three sets of strains—Sabin, Koprowski and Lederle—have been tested extensively in the field but the conditions under which they have been used have varied greatly and no attempts have been made to compare different strains under identical conditions. The Committee was therefore not in a position to make definite recommendations regarding the acceptability for general use of the different sets of vaccines at present available but it suggested that selection should be based on the following criteria: low neuro pathogenicity for monkeys, good immunizing effectiveness, genetic stability on human passage, lack of paralytogenic properties in man, restricted capacity to spread and reduced capacity to invade tissues remote from the alimentary tract. The importance of certain

of these properties has not yet been satisfactorily assessed however and a good capacity to spread is considered by some to be a desirable property resulting in a high level of immunizing effectiveness for the community. The Committee was of the opinion that neurovirulence for monkeys is the only property that has been adequately studied on a comparative basis although it is still not known to what extent it reflects human pathogenicity. As far as this property is concerned the three Sabin strains appear to approach most closely to the optimum and they all show good immunizing effectiveness. The question of the genetic structure and stability of polioviruses is of the greatest practical and theoretical interest and the Committee recommended that research in this field should be furthered by all available means.

The criteria given above also apply to the selection of new strains for inclusion in vaccines. Reference has already been made to the use of genetic markers for the identification of strains: it is hoped that it will also be possible to use certain of these markers to assess neurovirulence since they exhibit variations that are correlated to some degree with changes in neuro-pathogenicity for monkeys. Although this method is not yet sufficiently reliable a search is being made for further markers to increase its usefulness. After preliminary laboratory tests the first field trials with a new strain should ideally be restricted to persons without natural antibody but who have been successfully immunized with inactivated vaccine. If preliminary tests with the new strain yield satisfactory results strictly controlled tests may be carried out on gradually increasing numbers of fully susceptible children and later on higher age groups. Large scale studies should be initiated only after controlled tests in several hundred persons have been conducted without incident.

Further studies are needed on the development of post vaccinal viraemia. The clinical significance of viraemia following vaccination with live poliovirus is not yet known but information on the degree of viraemia produced by different strains of the same type would be useful in selecting the strains most suitable for the manufacture of vaccines.

Public health aspects

The choice of inactivated or live virus vaccine for large scale immunization programmes will depend upon the economic circumstances of the country concerned its previous experience in the manufacture and distribution of poliovirus vaccines and the epidemiological status of the population. Whichever type of vaccine is used serological surveys will play an important part in the vaccination and surveillance programme. Their applications include preliminary assessment of the immunological status of the population testing of batches of vaccine for potency and evaluation of the performance of a vaccine in the field as already described.

The Committee was prepared to recommend without reservation that live virus should be used for the vaccination of communities where poliomyelitis is essentially a disease of infancy and early childhood. Most members felt however that where more than 20% of paralytic cases occur in persons over 15 the presence in the community of such a high proportion of vulnerable non immune adults necessitates caution in the use of live vaccine and careful surveillance until it has been established that it produces no significant harmful effects. There is a strong case however for using live vaccine in the face of epidemic poliomyelitis when the risks of natural infection far outweigh the possible hazard from the use of live vaccine.

The Committee also recommended the use of live vaccine for its booster action and to induce intestinal immunity in countries using inactivated vaccine for primary immunization. As experience with live virus vaccine accumulates some of these countries may decide to change to the exclusive use of live vaccine once the vulnerable adult section of the population has been effectively immunized.

One important outcome of the development of live virus vaccines is that it opens up the prospect of the eventual eradication of poliomyelitis. Before eradication can be attempted further intensive epidemiological investigations of poliomyelitis in different regions of the world will be necessary but the Com-

mittee considered the whole problem worthy of the closest study both as a theoretical exercise and as a practical possibility

One of the difficulties confronting public health authorities when using live vaccines is interference with the establishment of intestinal infection owing to the presence of other enteroviruses. This has been repeatedly encountered and it has been reported that it can be overcome by larger doses of vaccine by repeated administration or by rapid mass immunization. When trivalent vaccines are used interference may also occur between the different strains of poliovirus but this is not considered an argument against the use of trivalent vaccines. In some instances however a carrier state may completely prevent the multiplication of a vaccine strain.

Knowledge of enteroviruses has greatly increased during the past three years and they have been shown capable of producing a wide range of clinical pictures some of which are liable to be confused with poliomyelitis. The most widely distributed are the Coxsackie group A viruses of which 24 distinct immunological types have been recognized so far. Coxsackie A types 1 2 4 5 6 7 9 10 14 16 and 23 have been incriminated as causing aseptic meningitis or meningoencephalitis and others are under suspicion. There is also evidence that Coxsackie A virus may be the causative organism in some cases of infectious polyneuritis (the Guillain Barre

syndrome). Among the Coxsackie group B viruses 6 immunological types have been recognized. They cause a number of syndromes including meningoencephalitis occasionally associated with mild and transient weakness and paralysis. The ECHO viruses types 4 6 and 9 have also been held responsible for several sharp outbreaks of meningoencephalitis and aseptic meningitis.

It seems likely that the increasing incidence of enterovirus infections in adults and older children is a reflection of improved hygiene and a decreasing incidence in earlier age groups. This trend may therefore be expected to continue and it is possible that as the older age groups are affected the diseases caused will become more severe. The Committee recommended that the study of these infections should be extended particularly with a view to maintaining a sound classification. It was noted that WHO had initiated a programme to make available authentic strains of enteroviruses and eventually reference preparations of sera. An International Reference Centre and a number of regional centres are being designated to co-ordinate this work and to accept for final identification strains of enterovirus of clinical or epidemiological significance. It is hoped also to accumulate epidemiological and clinical information on the importance distribution serological variation and paralytogenic properties of the enteroviruses.

Air pollution

Air pollution is a source of economic loss a social evil and a menace to public health. Economic loss from air pollution including damage to buildings metal fabrics etc. has been estimated to be some £250 000 000 per year—about 4% of the national budget—in the United Kingdom alone. In the same country where many towns are subject to heavy pollution the mortality from chronic bronchitis is forty times greater than in Denmark though other factors including smoking habits may also contribute to this situation.

A monograph entitled *Air Pollution* in which current knowledge on the subject is summed up by an international group of experts is about to be published by WHO and will be on sale early in 1961.

CHAGAS' DISEASE

Chagas disease (American trypanosomiasis) is an infection caused by *Trypanosoma cruzi* and transmitted by various triatomines infesting human dwellings. Although it is known to exist throughout the Americas except in Canada and perhaps Cuba much remains to be discovered about its true incidence. Ignorance of the magnitude of the problem is the main obstacle in the way of organizing and indeed justifying suitable control programmes in countries where mortality and morbidity from other diseases are apparently greater. A Study Group on Chagas Disease¹ was recently convened by the Pan American Sanitary Bureau which acts as the WHO Regional Office for the Americas and its report has now been published.²

Epidemiological aspects

Although there are so far no statistics on the prevalence of Chagas disease in the various American countries the group roughly estimated on the basis of existing information that at least 35 million people are exposed to the risk of infection with *T. cruzi*. If it is assumed on the basis of the epidemiological surveys carried out in several countries that the average infection rate is 70% then at least 7 million people are infected. Infection of vertebrates including humans has been reported from all countries in the region stretching from the United States in the north to Argentina and Chile in the south.

Although Chagas disease is more frequent in rural areas and small towns autochthonous cases are also common in the peripheral zones of cities.

One of the more important vectors is

T. infestans which is widely distributed over South America with infection rates varying generally from 20 to 30%. In the northern part of South America the principal vector is *Rhodnius prolixus* in Panama *R. pallescens* in certain parts of Peru *Panstrongylus herreri* and in Mexico some species of the *T. phyllosoma* group. Other widely distributed species are of less importance in maintaining Chagas disease. It was reported that in some regions *Panstrongylus megistus* is closely adapted to human habitations while in others it is prevalent around them.

Domestic animals particularly dogs and cats appear to be the most important reservoirs of *T. cruzi*. In some regions the cavy or guinea pig is of special importance. The forest reservoirs seem to be of limited importance as sources of human infection.

Pathogenesis and anatomical pathology

T. cruzi is a parasite which multiplies primarily in cells of mesodermal or mesenchymal origin. This form of multiplication itself constitutes a fundamental biological fact in the life-cycle of this protozoan and in its pathogenic action which is explained as due to a variety of mechanical inflammatory allergic and possibly toxic processes. Among other endogenous or exogenous factors nutrition and variations in the virulence of different strains of parasite also seem to be of some importance in aggravating *T. cruzi* infection.

Symptomatology

Chagas disease appears in two basic forms one acute and the other chronic with an intermediate phase between the two. The majority of the acute cases occur in young children or among recent arrivals in the endemic areas. The signs and symptoms of the acute forms vary greatly apart from those observed at the portal of entry there is usually fever generalized adenopathy slight enlarge-

Members (the S. & Group D. F. Bug F. Mexico D. W. F. Can. red. USA Dr E. Dias, Brazil (Chairman) Dr G. de Freitas, Brazil Dr A. Herrero Peru Dr C. M. J. Ineson, Panama D. A. R. Prebense, Chile Dr J. L. Pedreira de Freitas, Brazil (R. ppor. tou) Dr F. Pifan, Venezuela (Vice-Chairman) Dr T. Puzi P. Chile Dr C. F. Román, Argentina Dr R. V. Talice Uruguay Secretariat Dr N. A. Sari, WHO (Jin. Secretary) Dr A. N. Bica, PASB/WHO (Jin. Secretary) Dr R. H. C. H. eria, PASB/WHO Wild Int'l. Org. ech. R. Ser. 1960 202

ment of the liver and spleen general infectious symptoms cardiac enlargement and various electrocardiographic changes. In the more severe cases there may be signs that the nervous system is affected.

The best known chronic forms are the cardiac ones usually involving an increase in the size of the heart. Electrocardiographic changes are frequent and severe symptoms of cardiac insufficiency may occur. In addition to the cardiac forms alimentary forms—particularly mega oesophagus and megacolon—may at least in some endemic areas be manifestations of Chagas disease in its chronic phase. Some observers have reported the existence of chronic neurological forms.

Mortality in the acute forms has been approximately 10% in certain regions the lower the age group the higher the mortality rate although fatal cases in adults have been reported. In the chronic forms the symptoms are so varied that many deaths are registered wrongly the frequent sudden deaths from these forms are usually included among diseases of ill defined or unknown origin.

Diagnosis

Etiological diagnosis in the acute phase is based on the detection of *T. cruzi* in the peripheral blood. This should be done by methods employing direct examination of blood or of stained smears. In some cases more sensitive techniques must be used such as xenodiagnosis inoculation of laboratory animals and blood cultures. The precipitin test is positive in a high percentage of acute cases. The agglutination titres of cultures are high in the acute phase particularly if live *T. cruzi* cultures are used.

These methods have failed in almost all chronic cases owing to the smaller number of parasites in the blood. Here indirect methods—for example the complement fixation test—yield better results. It is most important to standardize the antigens and techniques used in this test.

In addition to cases which exhibit symptoms permitting clinical diagnosis of Chagas disease there are many others without typical symptoms in which a diagnosis can be estab-

lished only by means of laboratory tests. Supplementary examinations particularly by electrocardiography radiological examination and to a smaller extent blood tests can be of great value.

Control and prevention

The persistence of Chagas disease is due primarily to badly constructed dwellings these in conjunction with primitive habits favour the breeding of triatomas adapted to human dwellings. For the prevention of the disease therefore it is essential to improve housing and promote hygienic habits.

Some of the modern residual insecticides have proved effective against the triatomas. Gamma BHC and dieldrin have proved to be the most effective. The highly toxic effect of the latter on man and domestic animals makes it difficult to apply and prevents its use in hen runs and farmyards which are important breeding places for some species of *Triatoma*. Moreover in some areas it has been proved that dieldrin is not sufficiently effective against certain vectors. It has been demonstrated that BHC has satisfactory triatomocidal effects without having the drawbacks of toxicity reported in the case of dieldrin. None of the residual insecticides so far tried has a lethal effect on triatome eggs. Spraying should be very extensive and thorough covering not only the internal surfaces of houses and their furniture and fittings but also outbuildings where vectors frequently reproduce. It has been shown that a single spraying of dieldrin or BHC is insufficient to exterminate all the triatomas in a locality and it has therefore been recommended that a second or even a third spraying be performed with intervals of 30-180 days between each spraying.

So far resistance to insecticides has not been demonstrated in any *Triatoma* species. Despite the technical and administrative difficulties involved it was recommended that the results of simultaneous *Triatoma* control and malaria eradication programmes should be studied.

Health education is most important. It should aim at spreading knowledge of the harmful activity of triatomas and convincing

the population that it is important to exterminate them

The complement fixation test should be applied to blood donors as a matter of routine not only in endemic areas but also in regions where people coming from endemic areas have settled since it has been proved that Chagas disease can be transmitted to man through blood transfusion. If it is impossible to apply the complement fixation test

as a matter of routine the addition of trypanocidal substances to the blood could be useful. The prevention of congenital transmission presents great practical difficulties and it is necessary to study the conditions which may favour it.

The report concludes with recommendations on research and stresses the importance of international co-operation in the control of the disease.

CIRRHOSIS OF THE LIVER IN FRANCE

An investigation was recently undertaken by the nutrition department of the Institut national d'Hygiène, Paris, into the role of alcohol in the etiology of cirrhosis of the liver in France. One of the participants¹ in a seminar on the application of epidemiology in health administration held by the WHO Regional Office for Europe at Opatjka, Yugoslavia from 16 to 23 September 1960 presented the results of this investigation² as an illustration of the value of *ad hoc* epidemiological studies.

Cirrhosis of the liver is relatively more common in France than in the rest of Europe: the death rate in 1956 was the highest in western Europe (32.5 per 100 000 inhabitants as against 2.6 in England and Wales and 13.6 in the Federal Republic of Germany). For many years the medical profession in France has attributed the high incidence of the disease to excessive consumption of alcohol and statistics from hospitals agree that 80-85% of cirrhotics are alcoholic in origin. But the medical profession has been accused of prejudice and wine merchants have put forward the argument that in a population of which 80% are drinkers it could be maintained that practically all illnesses are alcoholic in origin. It is true—the argument proceeds—that the average consumption of wine in France (approximately 0.7 of a litre per adult per day; the strength of the wine being calculated at 80 grams of alcohol per litre) is much

higher than elsewhere and that the mortality from cirrhosis of the liver is also much greater, but this might be merely coincidence and the average consumption of alcohol though high is much less than would be needed to cause cirrhosis.

The fallacy in the latter part of this argument is obvious. Clearly if the average consumption is 0.7 of a litre per day some people drink less than this amount and some more and it is only among those who drink more that cirrhosis is alleged to appear when it is of alcoholic origin. Indeed French doctors maintain that two to four times as much alcohol as this average must be ingested to cause cirrhosis. But there was not enough factual evidence to show this. All that could be argued was that when the consumption of alcohol fell during the Second World War the death rate from cirrhosis of the liver also fell, a piece of presumptive evidence that was far from being universally accepted.

The nutrition department of the Institut national d'Hygiène sought to settle the matter by a survey designed to answer five questions. These were as follows: did persons believed to have cirrhosis of alcoholic origin drink more before their illness than random controls of the same age, same sex and same social environment without cirrhosis; were they less well nourished (i.e. is cirrhosis due to alcohol or to an associated nutritional deficiency); is the reduced food intake so often seen when cirrhosis becomes decompensated a cause or a consequence of the decompensation; can the amount of alcohol that causes cirrhosis be

¹ D. G. Piquet, Dep. Head of the Department of Nutrition, Institut national d'Hygiène, Paris.
² Unpublished working document EURO-187/10.

determined and what part does wine play in the alcoholism of cirrhotics?

The survey was carried out in hospitals in Paris, Marseilles and Nantes: all patients with alcoholic cirrhosis being questioned and a non-cirrhotic control being chosen at random in the same department for each patient questioned. The physical activity at work and outside work, the height and the usual weight before cirrhosis began were recorded and a detailed food questionnaire was devised to establish the daily food intake before and after the onset of the disease as well as the quantity of alcohol absorbed daily. In addition questions were asked to reveal the social background, about the patients' family and parents' income, living conditions and standard of living.

In all 116 cirrhotics and 116 controls were compared. They did not differ significantly in age, physical activity, weight or calorie or protein intake, but the alcohol intake of the cirrhotics was found to be approximately 2.5 times greater than that of the non-cirrhotics. Before they fell ill the cirrhotics had been just as well nourished as the others; consequently it was concluded cirrhosis cannot be attributed to dietary deficiencies.

The table below classifies the patients and the controls according to the amount of alcohol ingested.

	Cirrhosis	Controls
Less than 80 g	1	59
From 80 to 160 g	51	50
More than 160 g	64	7
Total	116	116

Only one out of the 116 patients with cirrhosis said that he had consumed less than 80 grams of alcohol (i.e. less than 1 litre of wine at 10°) daily. From this it may be inferred that alcoholic cirrhosis appears only when consumption of alcohol is greater than 1 litre a day. But 50 out of the 116 controls consumed 80 to 160 grams of alcohol a day (1 to 2 litres of wine) and it was only in the category from 160 grams (2 litres of wine) up that controls tended to decrease in number (7 out of 116) while more than half of the

cirrhotics (64 out of the 116) came within this range.

It seems reasonable to infer that cirrhosis is likeliest when the intake is between 2 and 2.5 litres of wine a day (172 to 212 grams of alcohol). Cirrhosis can occur when it is 1 litre or more, but when it exceeds 2 litres the probability of its occurrence is much increased.

Is decreased food intake a decompensating factor in cirrhosis? Apparently not to any marked degree: in 88 cases out of the 116 it failed to cause decompensation, thus even at this late state the nutritional deficiency is only associated, not causal.

Finally the survey established that wine represented 80-90% of the alcohol ingested.

What errors are possible in a survey of this kind? One is that the answers given are inaccurate, either because of observer error or because those answering the questions do not remember clearly or deliberately understate their alcohol consumption. Observer error can be allowed for by having the same person question both patients and controls. If the subject error is due to defective memory, mistakes will tend to cancel out if the number of subjects is large enough, but if it is due to deliberate falsification it may be cumulative. In a survey of the effects of alcohol on cirrhosis of the liver the likelihood is that patients will understate their consumption of alcohol. The survey has shown that cirrhotics consume 2.5 times more than non-cirrhotics and if this is an underestimate it merely strengthens the conclusion that excessive consumption of alcohol is liable to cause cirrhosis. If it is an underestimate of course it also follows that the lower limits of the toxic dose may be fixed rather too low, but this is not a disadvantage.

The other possible objection to this survey is that the controls were taken from patients in the hospitals. They were however people of the same age, same sex and same social background; they were chosen at random; they suffered from illnesses of different kinds and all were interrogated about their intake of alcohol prior to their illnesses. As controls they therefore seem to have been suitable.

POSTAGE OF PERISHABLE BIOLOGICAL MATERIAL

On the ground that delays in the despatch and arrival of perishable biological material by post were frequent to the detriment of the material and therefore of diagnosis and research the International Association of Microbiological Societies asked WHO to consider the question of the unification of rules and regulations in this connexion. WHO took up the matter in collaboration with the Universal Postal Union and after discussions at the Universal Postal Congress held in 1957 in Ottawa an article on the subject was inserted in the new Universal Postal Union Convention which came into force on 1 April 1959.

This new article lays down that for international postal transmission perishable biological material is to be packed and labelled in a particular way to be sent by letter post and to be exchanged only between officially recognized laboratories. Moreover this postal traffic may take place only between countries agreeing to it either on a reciprocal basis or as one way traffic. Living animals and insects are not to be accounted perishable biological material.

Material containing living pathogenic micro-organisms must be inserted into a flask or tube of thick glass or an ampoule securely corked or sealed so as to be airtight and waterproof after closure. This container must be wrapped in thick absorbent material such as cotton wool rolled several times round the container and tied above and below it to form a spindle shaped bundle which is then placed in a strong metal case and tightly closed. There should be enough absorbent material between the inner container and the case to absorb the liquid contents or any liquid that may form if the inner container breaks. The metal case should be so constructed and closed as to make contamination on the outside impossible and should itself be wrapped in absorbent material and placed in an outside container so that it is not loose.

The outside protective container must be of solid wood or metal or of material of equivalent strength and possess a lid that cannot come open in transit. Special precautions (e.g. freeze drying or packing with ice) must be taken to preserve the material if it is sensitive to high temperature and if it is being carried by air the packing must be strong enough to resist variations of atmospheric pressure.

It is also specified in the new article that the outside container or its outer cover if any must bear along with the addresses of the officially recognized despatching and receiving laboratories a violet label with a special symbol and the following notices in French the official UPU language: "*Cette étiquette ne peut être utilisée que par les laboratoires officiellement reconnus*" (This label can be used only by officially recognized laboratories) "*Matières biologiques périssables (à usage médical)*" (Perishable biological material—for medical use) "*Dangereux ne pas ouvrir pendant le transport*" (Dangerous not to be opened in transit) "*Sans valeur commerciale*" (Of no commercial value) and "*Emballé selon les règles postales internationales de sécurité*" (Packed according to international postal safety regulations).

Perishable biological material that does not contain living pathogenic micro organisms must be packed in a waterproof container and have an outer protective container as well and there should be absorbent material either in the inner container or between the inner and outer containers to absorb all the liquid contained or likely to form if the inner container is broken. The contents of both containers should be so packed that they are not loose. The same precautions must be taken as for material containing pathogenic micro organisms to protect the contents from high temperatures or from variations in atmospheric pressure.

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and the same label must be affixed with the same notices (except for those dealing with danger and opening in transit)

WHO and the Universal Postal Union have agreed on the form of the label and the wording to appear on it. National postal administrations can obtain stocks of the label from the headquarters of the Universal Postal Union, Berne, Switzerland, or if they wish purchase them from WHO direct.

Another question on which WHO and the Universal Postal Union are collaborating is that of the definition of officially recognized laboratories. In a circular letter to Member States, WHO has suggested that these might include laboratories directed or supported by governments, local authorities or universities

or licensed commercially or otherwise to produce biological products and to carry out biological research or any others that the competent authorities consider entitled to use the label established by the new Convention.

It is to be hoped that the regulations that have now been framed will solve the difficulties that led the International Association of Microbiological Societies to seek clarification and unification of the postal rules in force. All those engaged in public health work or international medical investigations who make use of the postal services for the international transport of perishable biological material should inform WHO of any difficulties they experience under the new regulations and of any improvements they think desirable.

Health Legislation

Iodine prophylaxis of endemic goitre

Experience has shown that iodine deficiency is the essential etiological factor in endemic goitre. At first sight therefore it is surprising to find that only a few countries have made iodine prophylaxis compulsory. The example of Switzerland, where iodine prophylaxis was introduced more than thirty years ago, has not been followed to any extent not because of any shortcomings in the method but because of technical, political or economic difficulties. In certain countries only coarse unrefined salt is used and this is difficult to iodize. Furthermore climatic conditions may render iodized salt unstable. It is difficult to convince the legislative authorities that there is real justification for introducing iodine prophylaxis when there are other health problems demanding priority. Financial considerations are also involved: the iodization of salt requires special equipment, iodine compounds are expensive and so is the specialized staff required for proper mixing. But the main reason why iodine prophylaxis is not more widely used is probably that in many countries no systematic surveys of

endemic goitre have been made until quite recently.

Such surveys show that endemic goitre is present to a greater or lesser extent in some 100 countries and territories, but of these only about ten have adopted legal measures to combat the disease. In Austria, the USA and the United Kingdom scientific committees have recommended the introduction of iodized salt but their recommendations have not been followed up by legislation.

In some countries iodine prophylaxis is applied on a purely optional basis or left to the initiative of the health authorities. However, experience has shown that legislation is the only rapid way of ensuring sufficient consumption of iodized salt to eliminate endemic goitre.

The WHO *International Digest of Health Legislation* has just published a survey of legislation on the prophylaxis of endemic goitre by iodine.¹ The use of iodized salt was

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first made compulsory in 1924 (Nidwalden and Vaud Switzerland). Between then and 1950 similar legislation was introduced in Canada (1949) Costa Rica (1941) Hungary (1948) Mexico (1942) and the Netherlands (1947). However the majority of the existing regulations on the iodization of cooking salt and other methods of prophylaxis by iodization have been introduced since 1950. The only countries making the use of iodized salt compulsory throughout the national territory are Canada Colombia Costa Rica Guatemala Panama Paraguay and Yugoslavia. In Switzerland where health measures are on the cantonal level the use of iodized salt is compulsory in most of the cantons whether goitrous or not.

In Brazil Bulgaria Hungary Mexico the Netherlands and Peru the legislation covers only the goitrous areas. The Chilean legislation authorizes the introduction of iodized salt but does not indicate that its use is compulsory.

The most commonly specified method of remedying iodine deficiency is the iodization of kitchen salt. In 1953 the WHO Study Group on Endemic Goitre recommended that food salt be iodized in the proportion of 10 mg per kg on the basis of a daily salt consumption of 10 g. It was agreed however that this proportion might be varied according to circumstances and in fact the proportions prescribed in some countries are different.

The regulations may provide for certain exceptions. Thus as far back as 1924 in the Swiss cantons where iodization of salt was compulsory non iodized salt could be obtained on presentation of a medical certificate and at the express wish of the person concerned. In Costa Rica and Panama pharmacies may sell non iodized salt to persons presenting medical certificates.

In some cases the regulations provide for supervision of iodization factories and installations and for the analysis of samples of iodized salt to check whether they contain the stipulated amount of iodine. In Brazil for example factories have to be inspected every two months and salt samples taken at each inspection. In Bulgaria iodized salt must be analysed every two months. Requirements

are similar in the USSR where the instructions also provide that each consignment of salt be accompanied by a certificate indicating the iodine content. If difficulties arise during transport or if the packing is defective the salt must also be analysed on arrival. Salt samples are taken by representatives of the health and epidemiological services of the USSR Ministry of Health or by the authorities in charge of goitre control. In Guatemala the General Association of Salt Makers is authorized to inspect private factories preparing the salt and is responsible for notifying the health authorities of any fault deficiency or irregularity and for taking the measures necessary in each case to remedy such defects. The Public Health Administration may also order the inspection of factories by departmental delegates or health inspectors in order to ensure that the salt is being correctly iodized. In Peru supervision is entrusted to the medical officers in charge of the health units of the departments where the State salt enrichment factories are situated. These factories are required to report each month to the Department of Endemic Goitre the quantity of salt that has been iodized and to supply samples taken at both the factory and the place of distribution.

Some regulations include conditions governing the packing and labelling of iodized salt offered for sale. In Bulgaria fine iodized salt for retail sale must be packed in containers made of parchment paper and cardboard salt for wholesale supply must be in a triple wrapping. In a number of countries the iodine content the date of production the name of the factory and the net weight must be indicated on the wrapping.

There are few regulations containing provisions to facilitate the preparation and distribution of iodized salt. In Brazil the Ministry of Health facilitates the importation of sodium iodide or potassium iodide and supplies it at cost price to firms preparing iodized salt. In Guatemala the General Association of Salt Makers transmits to the competent authorities the necessary applications for exemption from customs duties etc. in order to facilitate the purchase of iodization equipment.

Notes and News

Regional Committee for the Eastern Mediterranean

Sub Committee A of the tenth session of the WHO Regional Committee for the Eastern Mediterranean met in Tunis from 15 to 19 August 1960 and Sub Committee B met in Geneva from 24 to 26 August 1960.

Sub Committee A elected the following officers: Dr Ahmed Ridha Farah (Tunisia) Chairman, Dr A. A. Zakı (Sudan) and Dr A. Nabılsı (Jordan) Vice Chairmen. Dr S. Syman (Israel) was elected Chairman of Sub Committee B and Mr H. Sebsebie (Ethiopia) Vice Chairman.

The resolutions adopted by the two Sub Committees on subjects common to both agendas were identical.

In his annual report Dr A. H. Taba, WHO Regional Director for the Eastern Mediterranean, stated that a quarter of the budget for the Region was now being spent on education and training. More than 1400 fellowships had been granted—217 in 1959 as compared with 32 in 1949—to health workers from the Region. More and more of these fellowships—one out of two in 1959—were for studies in the Region itself. The chief subject of study was public health administration, followed by environmental sanitation, nursing, maternal and child health, malaria eradication and tuberculosis control. Of 129 professors and teachers assigned by WHO in 1959 to 27 different countries and territories, 51 were assigned to 11 countries and territories in the Eastern Mediterranean Region.

WHO assisted malaria eradication campaigns were in operation in 11 countries and territories containing 84% of the population at risk in the Region. In 1959, 17 million persons in 6 adjacent territories had been protected against the disease. The eradication of malaria from the Region had become all the more urgent because of the development of insecticide resistance among vector mosquitos in certain areas. The success of the

programme was also threatened by the danger of the reintroduction of infection by nomadic groups and close co-ordination of programmes in neighbouring countries was therefore essential.

Smallpox had declined markedly in the Region during 1959: only 6262 cases had been reported in Pakistan as compared with 47 897 in the epidemic year 1958 and 24 724 in 1957. The decline in the disease was particularly marked in the countries where mass vaccination campaigns had been carried out. Dried vaccine had proved its value in these campaigns and five laboratories set up with help from WHO were already producing it in different countries of the Region. A WHO expert team had recently visited 9 countries to report on smallpox control activities and to estimate possibilities of eradication in the near future. The team considered that with a special effort eradication of smallpox from the Region could be achieved within four or five years.

Referring to bilharziasis which is endemic in 11 countries of the Region, Dr Taba spoke of the urgent necessity of intensifying research on the snail vectors of bilharziasis, molluscicides, chemotherapy and chemoprophylaxis of the disease and agricultural practices favouring its spread. Another communicable disease of particular importance in the Region is trachoma: research workers at the WHO assisted Ophthalmological Centre in Turis had succeeded in isolating the trachoma virus and were now attempting to produce an antitrachoma vaccine.

Other problems reviewed by Dr Taba included rural sanitation and the provision of safe water supplies, health problems of urbanization, nutrition, industrial medicine, protection against radiation and mental health in relation to social and economic change.

From the discussions on Dr Taba's report it was clear that the majority of countries in the Region had made advances in health during the year under review and that integrated and co-ordinated public health services were an important feature of their long term plans. As regards

education and training it was considered that auxiliary personnel should be recruited and trained with a view to the absorption into the general public health services rather than for specialized tasks. The need to continue assistance to medical faculties was generally stressed. An evaluation of the fellowships programme had been made and it was considered that this would be extremely helpful in formulating future plans. The general trend towards inter-country and inter-regional activities was commended.

Although the malaria and smallpox eradication programmes were progressing favourably it was felt that there was room for improvement in inter-country co-operation and legislation in connexion with these programmes. Participants also felt that research on trachoma, bilharziasis, tuberculosis, leprosy and onchocerciasis should be intensified.

It was urged that work in paediatrics should be strengthened, that nursing curricula should include social medicine, public health and mental health courses, and that the influence of nomadism on health problems should be studied.

The proposed programme and budget estimates for 1962 were endorsed by the Committee. They provided for the use of about \$7 000 000 from the regular WHO budget, as well as \$1 000 000 from United Nations Technical Assistance funds and approximately the same amount from the Malaria Eradication Special Account. A supplemental Technical Assistance programme for Cyprus and Somalia was approved.

Resolutions were adopted urging governments to promote more effective mental health services, recommending further study of leishmaniasis and its addition to the list of notifiable diseases in the Region, and urging Member States to organize special departments on radiation control in their respective Ministries of Health.

Both Sub-Committees held technical discussions on Tuberculosis control with particular reference to domiciliary treatment. The participants in the discussions recognized that tuberculosis remains one of the principal medical and social problems in the Eastern Mediterranean Region. They recommended that control programmes be made simpler, more economical and more effective, utilizing BCG vaccine and antimicrobial drugs for prophylaxis and therapy, and that the emphasis in these programmes be on

domiciliary chemotherapy. Solar radiation and its related heat effect on the human organism was selected as the subject of the technical discussions in 1962. Next year's subject is "Polio-myelitis".

Sub-Committee A decided to hold its 1961 meeting in Lebanon and its 1962 meeting in Saudi Arabia.

Anaemia in Mauritius

Anaemia has been a considerable public health problem in Mauritius for many years—affecting about 56% of the entire population in 1956—and it has been attributed variously to hookworm infection, malnutrition and malaria. Since 1954, however, malaria has been virtually eradicated from the island. In order to pin down the causes of the anaemia, which it was now obvious did not include malaria, the Government of Mauritius asked WHO to make a survey of the situation. This was begun in 1955 with interesting results that will shortly be published in the WHO Bulletin.

Until the survey was begun it was generally held on the basis of the findings of Sippe that the anaemia prevalent in Mauritius was nutritional macrocytic anaemia. It thus fell into the category of anaemias occurring among natives of tropical and subtropical regions with a blood picture in typical cases similar to that of pernicious anaemia and characterized by macrocytosis, extreme poikilocytosis, leukopenia, relative lymphocytosis and reticulocytosis, and so it was treated with yeast, vitamin B₁₂ or liver extracts. Sippe had stressed the importance of malaria in its etiology, pointing out that the maximal seasonal incidence of anaemia, from June to August, followed the peak incidence of malaria.

The main findings of the survey in blood film examination of cases of anaemia were hypochromia (95%) and microcytosis (84%) often associated with anisocytosis (64%) and poikilocytosis (42%). Macrocytosis on the other hand was rare (2%) and reticulocytosis was not a feature of the blood picture. When it was realized that the anaemia was usually hypochromic and

microcytic not macrocytic it was judged probable that it would generally respond to treatment with iron preparations and this proved to be correct in a trial with a series of 90 patients

The success of this trial suggested that the problem of anaemia in Mauritius might be solved by adding iron to the diet of the population. A number of therapeutic trials were then carried out not only with iron but also—to test the possibility that defective nutrition and hookworm infection had something to do with the anaemia—with folic acid, dried skim milk and anthelmintics. These substances were found to have no effect on the anaemia but the iron brought about a steady rise in the haemoglobin level. It was accordingly recommended to the Department of Education in Mauritius that every child attending primary school be given a tablet of ferrous sulfate daily during school term. When this recommendation was accepted haemoglobin surveys were made in a school where anaemia was common both before and after the scheme was introduced. The second survey eight months afterwards revealed a highly significant rise in the mean haemoglobin and a marked diminution in the incidence of anaemia—an improvement observed in boys and girls of all ages.

Further trials were carried out to ascertain the amount of iron required to bring about a satisfactory increase in haemoglobin levels and it was calculated that initial enrichment of the diet with 10 mg of elemental iron per head per day would be adequate. This might be reduced progressively until a satisfactory maintenance dose was found.

The conclusion of the survey was that circumstances in Mauritius appear suitable for the introduction of enrichment with iron of the national diet as a means of reducing the incidence and severity of hypochromic microcytic anaemia in the whole population. The mean calculated intake of elemental iron in a random sample of people from a village where anaemia was rife was found in the survey to be 6.3 mg per head per day and estimates of the total food supplies available in the island in the years 1955–1957 indicated that the average diet supplied only 10.2 mg of elemental iron. These amounts are much smaller than those recorded in other tropical areas and would seem hardly sufficient to meet physiological requirements. The iron content of the diet is low: the author of the Bulletin paper thinks

because iron rich foods are little consumed, a possible reason for this being that rice—an important item in the local diet—is so cooked that the iron it contains is lost. It is estimated that at least 37.5% of the population of Mauritius suffer from hookworm infestation leading to a chronic loss of blood. The failure of anthelmintics alone to raise haemoglobin levels during the trials is probably due to the absence of sufficient iron in the diet to restore haemoglobin levels after the hookworms are eradicated. The investigators were unable to attribute much importance to the loss of iron in sweat or to the state of protein nutrition among the islanders.

Teaching of radiation medicine

A short course on radiation medicine for teachers in medical schools was held by the Middlesex Hospital, England, from 31 August to 27 September 1960 at the invitation of the WHO Regional Office for Europe. It was attended by nine fellows from the following countries: Austria, Czechoslovakia, Denmark, Germany, Netherlands, Norway, Sweden, Switzerland and Yugoslavia. All participants were experts in the field of radiation medicine and it is hoped that they will organize teaching courses for undergraduate students in their respective countries.

The course covered the following subjects: radiation physics and chemistry, including measurement of radioactivity, use of radioactive isotopes as a research tool in physiology, biochemistry and medicine, effects of ionizing radiations on animal and human tissues, genetic effects, use for diagnosis and therapy, disposal of waste products in laboratories, hospitals and industry, protection from hazards in industry, national disasters involving contamination of the environment. Special attention was paid to the use of teaching aids and to teaching methods, particularly those involving the participation of several disciplines, whether group discussions, combined lectures or practical exercises.

The participants in the course visited a number of scientific institutes and research establishments and took part in laboratory demonstrations and experiments suitable for the instruction of medical students at different stages of the curriculum. They also saw a selection of films on various aspects of radiation medicine.

Application of epidemiology in health administration

A seminar on the application of epidemiology in health administration was held by the WHO Regional Office for Europe in Opatija, Yugoslavia, from 16 to 23 September with the participation of 23 public health administrators from 22 countries and an international panel of lecturers.

The seminar began with a full discussion of the value and limitations of the sources of data generally available to health departments for both communicable and non-communicable diseases. Additional epidemiological methods which might be used when these sources are inadequate to guide action were then considered. The following specific topics were introduced by lecturers and then generally discussed: the place and limitations of mortality data; the use of routine sources for mortality information; the organization of special registers for tuberculosis and cancer survey methods and the use of sampling procedures; *ad hoc* epidemiological studies; assessment of the efficacy of control measures. During the seminar participants paid a visit to the Health Centre in Rijeka.

Training in medical rehabilitation

A training course in medical rehabilitation started in Copenhagen on 3 October 1960 under the auspices of the WHO Regional Office for Europe and the Danish Government. It will continue until the end of June 1961 and participants will study in Denmark for the first eight months. The final month will be devoted to training in vocational and industrial rehabilitation in the United Kingdom.

The course is primarily for qualified physicians wishing to study medical rehabilitation either generally or in relation to a specialty such as geriatrics, orthopaedics, neurosurgery, rheumatology, etc. The social, vocational and industrial aspects of rehabilitation will also be dealt with with the collaboration of the United Nations and the International Labour Organisation.

Both theoretical and practical instruction will be given in such fields as anatomy, physiology of the locomotor nervous systems, blood circulation, traumatology and psychology in relation to dis-

ability. Special topics will include psychotherapy, rheumatology, geriatrics, neurosurgery, orthopaedic appliances, organization of the rehabilitation team, vocational tests, psychometrics, etc. There will also be discussions and visits to rehabilitation centres. The course—which it is hoped to repeat in subsequent years—will conclude with an examination and successful candidates will receive a diploma from Copenhagen University.

Eight fellows have been nominated to take part by the Governments of the following countries: Greece (1), Iraq (1), Lebanon (1), Spain (2), Turkey (1), United Arab Republic (Province of Egypt) (1) and Yugoslavia (1).

International tuberculosis training course

Since 1953 WHO has supported out of Technical Assistance funds an international tuberculosis training course given once a year at the International Tuberculosis Training and Demonstration Centre in Istanbul, Turkey. WHO recruits international lecturers for the course and provides fellowships for physicians and nurses from countries eligible for technical assistance to enable them to attend.

This year's course was held from 16 September to 15 October and as in previous years it dealt mainly with the preventive and social aspects of tuberculosis. It included lectures, demonstrations and discussions and was attended by 17 physicians and nurses from the African, Eastern Mediterranean and European Regions.

Expert Committee on Mental Health

A WHO Expert Committee on Mental Health met in Geneva from 4 to 10 October 1960. One of its tasks was to review present resources in personnel and facilities for mental health work in the various countries of the world. An enquiry made before the meeting showed that these resources were in general inadequate. Out of 32 countries supplying information, only 4 have anything approaching the desirable proportion of one psychiatrist per 10 000 population. There are

also serious shortages in psychiatric nursing personnel and even in highly industrialized countries there are psychiatric hospitals without appropriately trained staff

The Committee devoted much time to considering types of research both national and international which must be given priority if further advances are to be made in preventing mental illness. These included investigations into brain function, social attitudes, effects of cultural change, psychoses of the aged, effects of nutrition and genetic factors.

An account of the Committee's work will appear in the *Chronicle* when its report is published.

European seminar for sanitary engineers

Some 50 sanitary engineers and administrators of national environmental sanitation programmes from 23 European countries took part in the seventh European seminar for sanitary engineers sponsored by the WHO Regional Office for Europe and held from 6 to 13 October at Ciudad Universitaria, Madrid, in co-operation with the Spanish Government.

Previous seminars including those at Rome (1951), London (1952), Opatija (1954), Helsinki (1956) and Nice (1958) discussed the training and functions of sanitary engineers, water supply and purification, sewerage and sewage treatment (both domestic and industrial), solid waste or refuse disposal, prevention of water and air pollution, standards for drinking water, biological and chemical relationships, housing sanitation and the increasing use of radioactive substances.

The main theme of this year's seminar was research needs in sanitary engineering and the measures which should be taken to meet such needs by governments, research institutes, universities and technical schools and industrial or municipal establishments. It is recognized that present day methods of sanitary engineering, however successful, are still too empirical and based on insufficient knowledge. The resulting high costs and inefficiency tend to make sanitary improvements less accessible to large groups of the population, particularly in rural areas. In the urban areas, current methods are becoming less

and less effective in dealing with such growing problems as water and air pollution.

The seminar also discussed the treatment of small community sewage wastes, a field of great interest and importance in Europe and one in which considerable technical progress has been made in recent years and sanitary engineering requirements of atomic energy developments.

Fourteen working papers were presented by experts from Czechoslovakia, the Federal Republic of Germany, the Netherlands, Spain, Switzerland, the United Kingdom, the USA and the USSR, and by WHO technical staff.

Regional training course on vital and health statistics

A regional training course on vital and health statistics was held at the WHO Regional Office for the Western Pacific, Manila, Philippines, from 17 October to 25 November 1960, with the co-operation of the United Nations. Its aim was to help Member States improve their civil registration and vital and health statistical services so that the data produced may fulfil national needs and meet the criteria of international uniformity and comparability. As population estimates between census years are based on vital statistical data, it is essential for the countries and territories of the Region to be able to furnish reliable vital statistics in the years following the 1960-61 census.

The programme of the course was designed to provide members of national statistical services with additional training in the organizational, methodological and analytical techniques and practices of vital and health statistics, to give them an opportunity of exchanging information and ideas, to review the uses of statistics in health programmes and to develop uniform methods and minimum requirements for national vital and health statistics.

Lectures followed by group discussions and laboratory exercises were given on the following topics: vital statistics methods, health statistics methods, analysis and sample survey methods, with special emphasis on administrative and methodological problems. A demographic and health survey was conducted near Manila during the course, and field visits were held so that par-

Participants might study the operation of national provincial and local vital and health statistics services in the Philippines

The course was attended by 40 statisticians from Burma, China (Taiwan), the Federation of Malaya, Guam, India, Iran, Japan, Korea, the Philippines, Portuguese Timor and Viet Nam.

Pulmonary heart disease

A WHO Expert Committee on Pulmonary Heart Disease met in Geneva from 10 to 15 October 1960. The aims of the Committee were to define chronic pulmonary heart disease (cor pulmonale) in terms useful for further discussion; to provide a tentative classification; to describe in broad terms the pathophysiology of cor pulmonale; and to establish criteria for diagnosis; to consider principles for treatment and prevention of the causative diseases; and to present suggestions for future research.

An account of the Committee's work will appear in the *Chronicle* when its report is published. It is hoped that this report will help to dispel present confusion concerning this condition on which there has hitherto been no agreement about terminology, definition or classification.

Quarantinable diseases

The Committee on International Quarantine meets annually to review the functioning of the International Sanitary Regulations and the effect on international travel. This year's meeting was held in Geneva from 17 to 22 October.

The Committee noted that although there has been a decline in the incidence of the six quarantinable diseases in the past four years, with a corresponding reduction in mortality, there has been little change in the distribution throughout the world.

Cholera, which is usually present only in East Pakistan and some parts of India, appeared in Burma, West Pakistan and Afghanistan in 1960. For more than 30 years this disease has been confined to Asia, except for the 1947 epidemic in Egypt. Deaths from cholera in India and Pakistan have been steadily declining over the past 15 years.

Many foci of wild rodent plague still persist in Asia, Africa and the Americas, so that there is a constant danger that the disease may spread to rats in villages and towns. The annual average number of deaths from plague dropped from 170 300 in the years 1919-8 to less than 700 in 1954-58. In 1959 a total of only 83 deaths was registered in 10 countries.

The main focus of smallpox is still India and Pakistan, which in 1958 accounted for 18 000 cases out of the world total of 247 000, and in 1959 for 50 000 cases out of a total of 74 000. More than any other disease, smallpox is liable to be imported, especially by air, into countries normally free from it. This occurred several times during the past year.

In spite of increasing air traffic, yellow fever has not spread outside its usual foci in Africa and America. It exists principally as jungle yellow fever, which affects monkeys and is rarely contracted by man. The annual incidence is now low, although an epidemic occurred at the end of 1959 in parts of Ethiopia and in the Blue Nile and Upper Nile Provinces of the Sudan, where at least 118 cases and 87 deaths from the disease were notified.

Contrary to general belief, typhus is not regressing in Africa, where Ethiopia is now the principal focus. In the Americas, the situation is constantly improving, and the number of cases dropped from 25 000 a year in 1946-50 to 7500 in 1956-60. There has also been a constant decline in the incidence of the disease in Asia since the end of the Second World War.

The introduction of modern insecticides has made it an easy matter to prevent relapsing fever, which is transmitted by lice and ticks. There have been 2 doubtful cases in the Americas and hardly any in Asia since 1957. Although the number of cases in Africa seems to be on the increase, the disease does not constitute a serious health problem there, except in Ethiopia.

WHO membership

Eight African States have recently become full Members of WHO by depositing with the Secretary General of the United Nations formal instruments of acceptance of the WHO Constitution.

They are the Republic of Dahomey the Central African Republic the Republic of the Upper Volta the Republic of the Niger the Republic of Mali the Republic of the Congo (Brazzaville)

the Republic of the Ivory Coast, and the Republic of Senegal This brings the number of States which are full Members of the Organization up to 98

People and Places

Community water supplies in Ghana

WHO has sent a consultant team to Ghana to advise the Government on the development of a national programme for the improvement and extension of community water supplies

Mr A L McClure Deputy Chief Civil Engineer of the Crown Agents London England will advise on the engineering aspects of the programme Mr McClure served from 1926 to 1956 in the Malayan Public Works Service where his last position was that of Deputy Director of Public Works He has had wide experience in all types of civil engineering work specializing in water supply engineering during the latter part of his service in Malaya

Mr G W Putto Lawyer and Vice Director of the Dutch Government Institute for Water Supply at The Hague will be concerned with the administrative and legal problems involved in setting up a national water supply agency and will advise the Government on measures to be taken in this connexion Mr Putto has been active in water supply management for a number of years and was General Rapporteur on Legal Measures at the Brussels Congress of the International Water Supply Association in 1957

Finally the services of Dr H T Shenefield have been made available to the team for a limited period by the US International Co operation Administration where he is Chief of the Loan Administration Staff Dr Shenefield will serve as financial adviser to the programme

Leprosy control

Dr F M Noussitou of Argentina has been appointed by WHO to conduct a leprosy control project in Burma A former President of the Argentine Society of Dermatology Dr Noussitou has worked for WHO for several years first in the

ringworm control programme in Syria then as team leader of the venereal disease control project in East Pakistan

Venereal disease programme in Taiwan

Since 1953 the Government of Taiwan (China) has been establishing a comprehensive venereal disease control programme with help from WHO UNICEF and bilateral agencies The programme now covers the whole of Taiwan (with the Penghu Islands) and 431 health units including Taiwan's 22 health centres the associated health stations and several provincial county and municipal hospitals take part in it The work has thus been integrated into that of the established health services from the start

Dr Olav Idsøe of Norway has been appointed by WHO to undertake an evaluation of the programme and its achievements and is at present visiting Taiwan for this purpose Dr Idsøe has wide experience of venereal disease control in Europe Africa and the Eastern Mediterranean and Western Pacific Regions

Prevalence of periodontal disease

Dr Jens Waerhaug Professor of Periodontology and Crown and Bridge Prosthesis at the University of Oslo Norway has been appointed by WHO to undertake a pilot survey on the prevalence and distribution of periodontal disease among selected age groups in urban and rural communities in Ceylon

A recognized authority on periodontal disease Professor Waerhaug has done a considerable amount of research on the anatomy histology and histopathology of the supporting structures of the teeth In 1953-54 he spent a year in the USA as research associate at the University of Minnesota and subsequently conducted courses

and gave lectures in his specialty to members of the dental profession in the USA, Australia, the United Kingdom and Scandinavia. He acted as consultant to the WHO seminar on dental health held in Adelaide, Australia, in February 1959 and to the WHO Expert Committee on Dental Health in August 1960.

Public health administration

At its twelfth session in 1961 the United Nations Committee on Information from Non-Self-Governing Territories will pay special attention to the question of social conditions in these territories. A study on health conditions which is being prepared by WHO for the Committee's session, will deal with the organization of the health services in Kenya, particularly in rural areas.

Dr J. D. Kershaw, Medical Officer of Health for Colchester, England, has been appointed to undertake this study. His assignment includes a four-week visit to Kenya to study the health services there at first hand, followed by a period in Geneva to write his report. Dr Kershaw has undertaken several assignments for WHO, including the preparation of an earlier study—on long-term health planning—for the Committee on Information from Non-Self-Governing Territories.

Financing of medical care

As part of a WHO survey on the costs and financing of medical care, pilot studies were started in six countries in 1959. Mr B. Abel-Smith, Lecturer in the Department of Social Administration of the London School of Economics, recently visited two of these countries—Sweden and Czechoslovakia—to assess the progress of the studies and to discuss with the authorities concerned the data so far collected. Mr Abel-Smith has already carried out a number of assignments for WHO in connexion with the survey. It is expected that most if not all of the pilot studies will be completed by the end of the year.

Tuberculosis in the Malagasy Republic

Dr Maurice Gilbert has been appointed by WHO to study the problem of tuberculosis in the Malagasy Republic and to determine the extent to which the Organization can assist the Government in its efforts to control the disease.

Dr Gilbert, who was educated in Geneva and Paris, has been active in tuberculosis work for many years. He represents the International Union against Tuberculosis in its relations with WHO and with the International Labour Organisation.

Tuberculosis in cattle

Bovine tuberculosis is probably not of great importance at present because in most parts of the world milk is not only boiled before consumption and in the other areas pasteurization of milk and control of bovine tuberculosis sections have been put to extensive practice. However, in countries where tuberculosis among cattle is a problem, it is also a menace to man and in these countries complete control of tuberculosis cannot be achieved unless attention is also paid to the detection of preferably eradication of tuberculosis in cattle. In some areas it is desirable to determine the possible role of tuberculosis in other animals as a source of infection for man and animals.

From the seventh report of the WHO Expert Committee on Tuberculosis (Wld Hlth Org. Techn. Rpt. Ser. 1960:195).

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and rather surprisingly that continued treatment with isoniazid alone did not reduce the risk of relapse.

In recent years domiciliary chemotherapy with isoniazid alone has been used on an increasing scale in several developing countries. This regimen has many obvious practical advantages over the combined therapies but relatively little is known about its efficacy. A controlled comparison which is reported in the fourth of the papers indicates that treatment with isoniazid alone—in standard daily dosage (3.955 mg/kg body weight) or high daily dosage (7.896 mg/kg body weight)—is less satisfactory than the standard combined chemotherapy with isoniazid and PAS. The patients, who were all treated at home and mostly presented with cavitory disease, showed less improvement on isoniazid alone. In addition, a high frequency of peripheral neuritis was observed in the patients receiving a high dosage of isoniazid. The fifth paper gives a detailed report on the peripheral neuritis cases encountered in the controlled therapeutic comparison.

As described in previous reports, pretreatment cultures of tubercle bacilli from Indian patients included in the trials of the Tuberculosis Chemotherapy Centre have been found to have a higher average level of resistance to PAS than pretreatment cultures from British patients. An investigation reported in the sixth paper in this issue by the Centre and the MRC Group for Research on Drug Sensitivity in Tuberculosis reveals that the higher average resistance of the Indian strains is due to the presence of a small proportion of resistant organisms. There was, however, little if any evidence that the efficacy of the standard combination of isoniazid plus PAS was impaired in the Indian patients.

In recent years the isolation of atypical strains of mycobacteria from pulmonary and extra-pulmonary lesions has been reported with increasing frequency. The reports refer mainly to Europe and the USA and very little is yet known about the distribution of different mycobacteria in the developing countries. The next paper in this issue is concerned with a study carried out jointly by WHO, the Kenya Medical Department and the Tuberculosis Research Institute in Prague on the isolation, typing and drug sensitivity of mycobacteria from the lymph nodes of African patients. All strains isolated proved to be

of the human type but in the case of some patients previously untreated the lymph node specimens showed granulation tissue typical of mycobacterial infection although no acid fast bacilli were demonstrated either by culture or by guinea pig tests. Thus the possible occurrence of atypical mycobacteria in African patients needs further investigation.

In the course of WHO/UNICEF assisted tuberculosis surveys in Africa sputum specimens were sent to certain European laboratories for culture owing to the lack of adequate local laboratory facilities. Strikingly few positive cultures were obtained and those were usually only from specimens strongly positive on direct microscopy. The paper by L. Šula, T. K. Sundaresan & M. Langerova reports on an investigation into the influence of storage and transport—from Prague to Africa and back—on the survival of mycobacteria in pure cultures and in sputum specimens. There was a great decrease in the cultivability of the mycobacteria contained in the material which was treated in the same way as the routine specimens received from the African tuberculosis surveys.

A second condition for the successful culturing of mycobacteria is the sensitivity of the diagnostic medium. The Löwenstein-Jensen (LJ) medium commonly used gives good results when properly made but its sensitivity varies greatly when it is prepared in different laboratories, thus precluding international comparison of results. As reported in the next paper, comparative trials carried out at the Tuberculosis Research Institute in Prague with LJ medium from seven national laboratories have demonstrated that even media prepared in different departments of the same institute are of unequal sensitivity for both laboratory strains and primary cultures. These results stress the need for a standard diagnostic medium. It is suggested that a freeze-dried medium which would keep for long periods would serve this purpose; it could be prepared and tested for sensitivity in one laboratory and then distributed for general use.

The paper by O. Horwitz & J. Knudsen of the Danish Tuberculosis Index reports on a four-year follow-up of the attenders and the non-attenders at the Danish mass campaign in 1950-52 which combined case-finding and BCG vaccination. The incidence of tuberculosis was found to be

Review of WHO Publications

TUBERCULOSIS

Bulletin of the World Health Organization 1960
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The progress made in recent years in the chemotherapy of tuberculosis has been such as to revolutionize the approach to the control of this disease. It is to a large extent because of the introduction of effective antituberculosis drugs, particularly isoniazid, that for the first time the possibility of eradicating tuberculosis can be envisaged. However, although in the last ten years extensive clinical trials have been made of different chemotherapeutic regimens, the problem of the best treatment of tuberculosis in both medical and economic terms is still far from being solved. This and other problems related to the chemotherapy of tuberculosis are the subject of the first six papers in this issue of the Bulletin.

In the first paper W. McDermott reviews the present state of knowledge of the chemotherapy of pulmonary tuberculosis. The great advances that have resulted from the introduction of isoniazid are stressed; the most effective of the combined drug regimens in use today all include isoniazid and it is this drug which provides the major part of their antituberculous action.

An important problem discussed in this paper is whether the large scale use of isoniazid in home treatment programmes will result in a significant spread of isoniazid-resistant bacilli. Very little is as yet known about the risk to the community of the presence of persons excreting isoniazid-resistant organisms. McDermott suggests that the risk is considerably greater in areas with a low technological development and a high tuberculosis morbidity than in highly developed areas with a low tuberculosis morbidity. He concludes, however, that even in the former areas the case for going ahead with the widespread use of isoniazid considerably outweighs the case for not going ahead. The risk to the community could be reduced by more selective treatment programmes

chemotherapy being combined with collapse or excisional therapy in certain patients.

The next five papers present the results of studies conducted by the Tuberculosis Chemotherapy Centre in Madras, South India. This centre was set up in 1956 under the joint auspices of the Indian Council of Medical Research, the Madras State Government, the World Health Organization and the Medical Research Council of Great Britain (MRC) to investigate problems of large scale chemotherapy of tuberculosis under the conditions prevailing in a developing area.

In a previous study by the Tuberculosis Chemotherapy Centre¹ it was shown that a year's domiciliary treatment with isoniazid plus PAS for all practical purposes gave as satisfactory results as a year's institutional treatment with the same combination of drugs. This finding suggested that domiciliary chemotherapy might be of considerable value in countries where the tuberculosis problem is aggravated by a shortage of hospital beds. Before domiciliary chemotherapy can be introduced on a larger scale, however, a number of important problems have to be evaluated. One of the most important is whether domiciliary treatment of open cases exposes their contacts to a special risk of infection. A study of this problem is described in the second paper in this issue. The results indicate that the place where the patients were treated—at home or in a sanatorium—did not influence the incidence of clinical tuberculosis or of tuberculous infection in their family contacts. Another problem concerns the risk of relapse after domiciliary chemotherapy as compared with institutional chemotherapy. The third paper reports on a twelve-month follow-up of patients who had attained bacteriological quiescence by the end of one year of combined chemotherapy either at home or in a sanatorium. This study included treatment either with isoniazid alone or with a placebo. It was found that the relapse rate of the home patients differed very little from that of the sanatorium patients.

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lower among the attenders. From a detailed comparison of the two groups the authors conclude that the lower morbidity rate among the attenders reflects the effect of the mass campaign since in the campaign cases were detected early that would otherwise have remained undiagnosed until subsequent years.

Observations of particular relevance to the standardization of tuberculin are reported in the paper by G. W. Comstock. In a comparison of two purified tuberculins—PPD S and RT 19 20 21—in schoolchildren in the south-eastern part of the USA a marked qualitative difference was found between them. In children with low grade sensitivity presumably of non specific origin the reactions to RT 19 20 21 tended to be larger than those to PPD S. In children with high levels of sensitivity the reactions to PPD S tended to be larger. Similar findings have been reported previously* from other countries (Nigeria and Mauritius) where low grade presumably non specific sensitivity is widespread.

Simultaneous duplicate tuberculin testing is often used in experimental work. A possible source of error in this method is brought to light

by the data reported in the last paper in this issue. In a study in BCG vaccinated infants given either a single test with 10 TU of old tuberculin or a duplicate test with 10 TU in one arm and 100 TU in the other it was found that the reactions to the low dose test were reduced in size when this test was given simultaneously with a high dose test.

Expert Committee on Poliomyelitis Third Report (World Health Organization Technical Report Series No 203) Geneva 1960 53 pages Price 3/6 \$0.60 or Sw fr 2— Published also in French and Spanish

This report is discussed at length in the article on page 462.

Study Group on Chagas Disease Report (World Health Organization Technical Report Series No 202) Geneva 1960 21 pages Price 1/9 \$0.30 or Sw fr 1— Published also in French and Spanish

This report is discussed at length in the article on page 469.

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